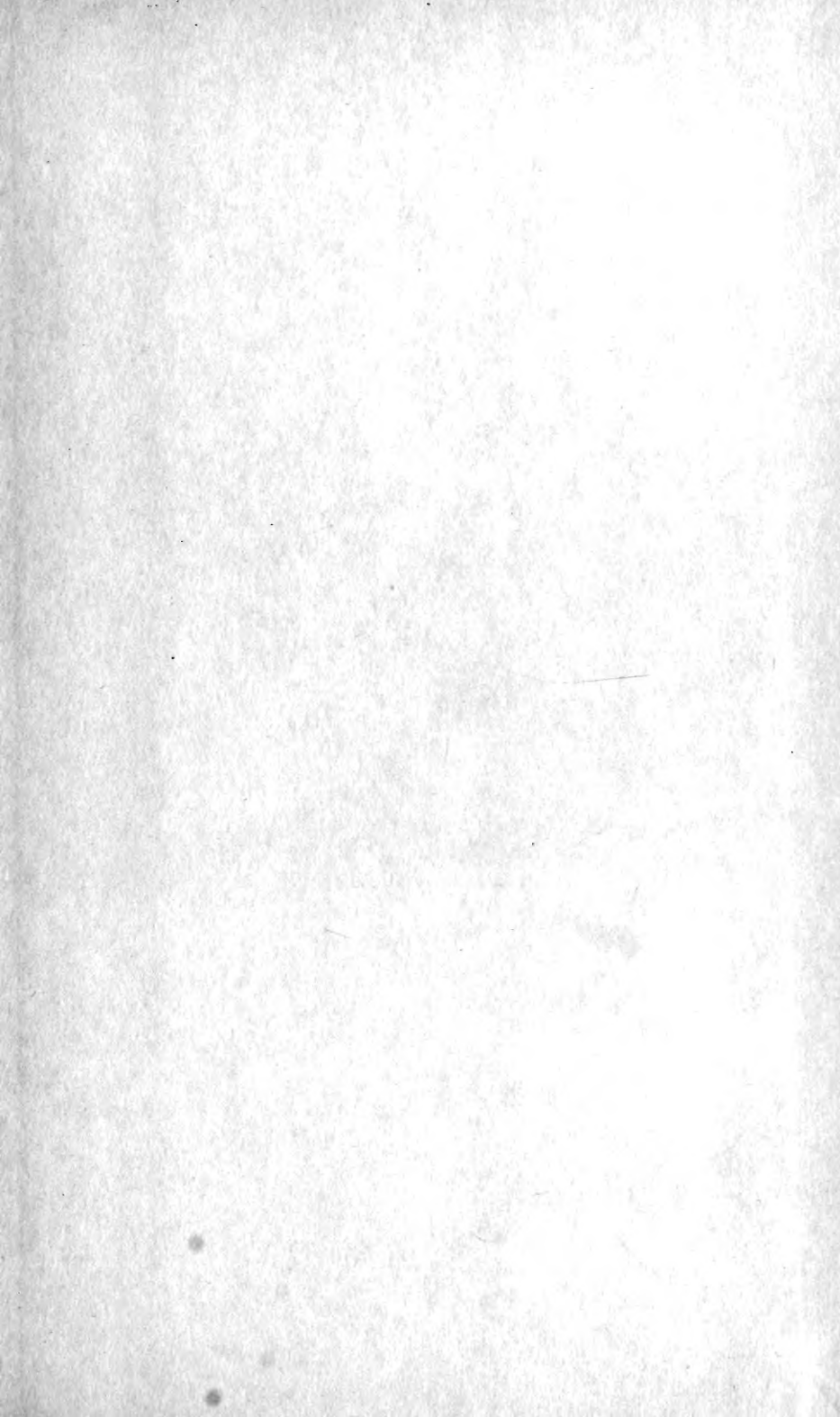


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1959-1962





LEAFLETS
OF
WESTERN BOTANY

VOLUME IX

SAN FRANCISCO, CALIFORNIA

1959-1962

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Owned and Published by

JOHN THOMAS HOWELL

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LEAFLETS *of* WESTERN BOTANY

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ECHEVERIA: CONSPECTUS SERIERUM

BY ERIC WALTHER

A. Plantae vestitae, corollis puberulis; caudex brevis, nullus vel altus; folia conferte rosulata vel subrosulata; inflorescentiae aequilaterales vel secundae; pedicelli bibracteolati vel ebracteolati; sepala patentia vel adpressa; corolla valde pentagonalis rubra vel coccinea.

Ser. 13. VESTITAE E. Walther

Typus: *E. coccinea* (Cav.) DC.

AA. Plantae dissimiles, perglabrae vel foliis puberulis et corollis glabris.

B. Corollae ad 33 mm. longae, 10 mm. diametro ad basin; styli 4-plo longiores quam ovaria; caudex brevissimus; folia conferte rosulata, crassa, cellulas palisadicas continentia.

Ser. 14. *Longistylae* E. Walther, ser. nov.

Typus: *E. longissima* E. Walther

BB. Corollae et styli breviores; folia haud cellulas palisadicas continentia.

C. Folia crassa, clavata; inflorescentiae cymosae vel subpaniculatae, bracteis numerosis saepe caducis; pedicelli tenues; sepala adpressa, breviter vel elongata; corolla cylindracea vel campanulata, nec urceolata nec pentagonalis; petala tenuia, vix excavata; nectaria parva, tenuia.

Ser. 1. PANICULATAE Berger

Typus: *E. amoena* L. de Smet.

CC. Plantae dissimiles.

D. Inflorescentiae et rami secundi; pedicelli raro bracteolati; corolla ad 24 mm. vel brevior; styli breves, usque duplo longiores quam ovaria.

E. Plantae acaulescentes; folia crassa, turgida, saepe crystallina, saepe hyalino-marginata; corolla urceolata subrotundata nec pentagonalis; petala nec carinata nec excavata; pedicelli tenues,

interdum turbinati; bracteae paucae, parvae, adpressae vel subpatentes; sepala saepe minuta, vel adpressa vel patentia vel reflexa; nectaria parva, tenuia.

Ser. 2. **Urceolatae** E. Walther, nom. nov.

Typus: *E. agavoides* Lemaire

EE. Plantae dissimiles; corolla pentagonalis, petalis excavatis; nectaria magna, crassa; folia nec crystallina nec hyalina.

F. Corolla valde pentagonalis, petalis acuto-carinatis, excavatis; inflorescentiae simplices vel ramosae; pedicelli brevissimi; folia crassa, conferte rosulata.

G. Folia valde pruinosa; bracteae planae.

Ser. 7. **Pruinosae** E. Walther, ser. nov. Typus: *E. Peacockii* Croucher.

GG. Folia non pruinosa, saepe canaliculata vel cornuta; bracteae subteretes.

Ser. 6. **ANGULATAE** E. Walther

Typus: *E. teretifolia* DC.

FF. Corolla obtuso-pentagonalis, petalis non carinatis; pedicelli elongati, breves; folia tenuiora, saepe magna; bracteae planae.

G. Plantae minores, caespitosae, caudice brevior vel brevissimo; folia numerosa, conferte rosulata; inflorescentiae minores, ramis solitariis, secundis, bracteis paucis; styli pallidi.

Ser. 3. **SECUNDAE** Baker, p.p.

Typus: *E. secunda* Booth

GG. Plantae mediocres vel maiores,

caudice brevi vel valido; folia pauca, saepe petiolata; inflorescentiae 2- vel 3- vel multi-ramosae, bracteis numerosis; styli atrati.

H. Plantae mediocres, caudice brevi; folia minora; inflorescentiae 2- vel 3- ramosae.

Ser. 4. **Retusae** E. Walther, ser. nov.

Typus: *E. fulgens* Lemaire

HH. Plantae grandes, caudice valido; folia magna, petiolata; inflorescentiae multi-ramosae, paniculatae, peraltae.

Ser. 5. **GIBBIFLORAE** Baker, p.p.

Typus: *E. gibbiflora* DC.

DD. Inflorescentiae aequilatrales; pedicelli bracteolati.

E. Plantae suffruticosae, caudice prominenti.

F. Folia minora, rosulata vel alternata.

G. Inflorescentiae conferte subspicatae; pedicelli saepe breves; sepala adpressa vel paulum patentia; corolla saepe flavida.

Ser. 9. **SPICATAE** Baker, emend.

Typus: *E. rosea* Lindley

GG. Inflorescentiae laxae racemosae vel subpaniculatae; sepala patentia; corolla raro flavida.

Ser. 8. **AUSTRALES** E. Walther

Typus: *E. nuda* Lindley

FF. Folia maiora, rosulata vel alternata; inflorescentiae elatae.

Ser. 10. **Elatae** E. Walther, ser. nov.

Typus: *E. bicolor* (HBK.) E. Walther

EE. Plantae acaulescentes vel caudice brevis-

simo; folia rosulata, minora vel mediocria, raro magna.

F. Radices fusiformes, crassae; folia saepe semidecidua; pedicelli superiores breves; sepala saepe adscendentia; corolla saepe lata.

Ser. 12. MUCRONATAE E. Walther
Typus: *E. mucronata* Schlecht.

FF. Radices fibrosae, haud fusiformes.

Ser. 11. RACEMOSAE Baker, p.p.
Typus: *E. racemosa* Schlecht.

ECHEVERIA: BIBLIOGRAPHIA SERIERUM

Series 1. PANICULATAE Berger, p.p., in Engler, Nat. Pflanzenf., Ed. 2, 18a:472 (1930). Ser. *Amoenae* E. Walther, Cactus & Succ. Journ. 30, No. 4:105 (1958).

Series 2. URCEOLATAE E. Walther, nom. nov. *Urbinia* Britton & Rose, Bull. New York Bot. Gard. 3:11 (1903); N. Amer. Fl. 22, Pt. 1:32 (1905). Sect. *Urbinia* Berger in Engler, Nat. Pflanzenf., Ed. 2, 18a:476 (1930). Ser. *Urbinae* E. Walther, Cactus & Succ. Journ. 7, No. 4:60 (1935); etc.

Series 3. SECUNDAE Baker in Saunders, Refug. Bot., Vol. 1, seq. tab. 72 (1869).

Series 4. RETUSAE E. Walther, ser. nov.

Series 5. GIBBIFLORAE Baker, p.p., in Saunders, Refug. Bot., l.c. Ser. *Grandes* E. Walther, Cactus & Succ. Journ. 30, No. 2:40 (1958).

Series 6. ANGULATAE E. Walther, Cactus & Succ. Journ. 7, No. 5:69 (1935).

Series 7. PRUINOSAE E. Walther, ser. nov.

Series 8. AUSTRALAE E. Walther, Cactus & Succ. Journ. 7, No. 3:39 (1935). Ser. *Nudae* E. Walther, ibid., 30, No. 2:46 (1958). Ser. *Bracteolatae* E. Walther, ibid., 30, No. 5:153 (1958). Ser. *Spicatae*, Ser. *Racemosae* Baker, p.p., in Saunders, Refug. Bot., l.c.

Series 9. SPICATAE Baker, emend., in Saunders, Refug. Bot., l.c. *Courantia* Lemaire, Jard. Fleur., 1, misc. 92 (1851); Rose, N. Amer. Fl. 22, Pt. 1:33 (1905). Sect. *Courantia* Berger in Engler, Nat. Pflanzenf., Ed. 2, 18a:481 (1930).

Series 10. ELATAE E. Walther, ser. nov.

Series 11. RACEMOSAE Baker, p.p., in Saunders, Refug. Bot., l.c.; E. Walther, Cactus & Succ. Journ. 30, No. 2:44 (1958).

Series 12. MUCRONATAE E. Walther, Cactus & Succ. Journ. 7, No. 3:36 (1935).

Series 13. VESTITAE E. Walther, Cactus & Succ. Journ. 30, No. 5:149 (1958). Sect. *Vestitae* E. Walther, ibid., 7, No. 4:60 (1935). *Oliverella* Rose, p.p., Bull. New York Bot. Gard. 3:2 (1903). *Oliveranthus* Rose, N. Amer. Fl. 22, Pt. 1:27 (1905).

Series 14. LONGISTYLAE E. Walther, ser. nov.

FURTHER NOTES ON CARTHAMUS IN
CALIFORNIA

BY AMRAM ASHRI AND P. F. KNOWLES

University of California, Davis

With the establishment of safflower (*Carthamus tinctorius* L.) as a commercial crop in California in 1950, and its continued production in the state, we felt that it might be of interest to study its relationships to other species of the genus. Two such species are *C. lanatus* L. and *C. baeticus* (Boiss. & Reut.) Nym., both reported by J. T. Howell to occur as wild weedy species in California (5).¹ The results of crossing these and other wild species with *C. tinctorius* have been reported elsewhere in detail (1). Suffice it to say that *C. tinctorius* has 12 pairs of chromosomes, *C. lanatus* 22 pairs, and *C. baeticus* 32 pairs. Our studies have required a rather detailed review of the literature and extensive examination of herbarium specimens, which have added a little to our knowledge of the history of *Carthamus* in California, and have indicated where new locations of the wild species have been reported. Herbaria referred to here are the California Academy of Sciences Herbarium (CAS), the California Department of Agriculture Herbarium (CDA), and Dudley Herbarium at Stanford University (DS), the University of California Herbarium at Berkeley (UC), and the Department of Agronomy Herbarium at Davis (AHUC).

Our earliest California reference to safflower was in a booklet by Dr. H. H. Behr in 1884 (2). He reported that the specimen was an annual, that it had yellow flowers and no pappus, and that it grew near San Francisco. It probably was *C. tinctorius*.

Specimens of *C. lanatus* were collected in 1891 by T. S. Brandegee in South San Francisco (UC, DS). Bioletti collected similar specimens from the same location in 1892 (UC). Greene (4) referred to the latter collection under the name *Centrophyl- lum lanatum* (L.) DC. & Duby and stated that it was naturalized about South San Francisco. Though his site has been referred to a number of times until 1911, we have not been able to find survivors nor recent references to it. Bolander in 1870 (3) did not refer to *Carthamus* species in the vicinity of San Francisco.²

Other sites, in addition to those reported by Mr. Howell (5),

¹ Numbers in parentheses refer to papers in the bibliography.

where *C. lanatus* has been found are as follows: Palo Alto, Santa Clara Co., *Keck in 1946* (CAS, DS, UC); Chileno Valley, Marin Co., *Howell in 1946* (CAS) (6); Arroyo Grande and Toro Creek Road, San Luis Obispo Co., *Chalmers in 1954* (personal communication)—one of these may have been the location referred to by Dr. W. W. Robbins (8); and west of Skaggs Springs, Sonoma Co., *Crampton in 1957* (AHUC). In all of these locations the species still survives. The infestation of the Toro Creek Road was much reduced by applications of 2,4-D (2,4-dichlorophenoxyacetic acid). In 1957 that in Palo Alto appeared to be reduced in size and abundance by the culture of barley. Under conditions of grazing the stand in the Chileno Valley in 1955 seemed to be spreading. The occurrence west of Skaggs Springs appears to be only along the shoulders of the road.

According to Robbins (8), *C. lanatus* was reported by Ball in 1937 to be established near Santa Ana, and by Johnson in the same year to be growing at Olinda, both in Orange County. This was not confirmed.

When grown under nursery conditions at Davis, plants from Palo Alto, Chileno Valley, and San Luis Obispo County appeared to be slightly but distinctly different in their patterns of development. They were rather uniform within the collections. This would suggest that each stems from a separate introduction. The collection from near Skaggs Springs has not been compared with the other collections under nursery conditions.

Other sites in addition to those mentioned by Howell (5) where *C. baeticus* has been found are: Tonner Canyon and Olive, Orange Co., *Dudley in 1934* (personal communication); Francisquito Canyon, Los Angeles Co., *Becker in 1948* (personal communication); east of Stockton, San Joaquin Co., *Mahoney before 1955* (personal correspondence).

Carthamus baeticus was seen in several locations near Sonora and Jacksonville in Tuolumne County, confirming the reports of Howell (5). No serious effort was made to find the species in the other locations reported by him—these were in San Luis Obispo and San Diego counties.

In the absence of efforts to control it, *C. baeticus* becomes a

² As given in these references, "South San Francisco" probably does not refer to the community with that name in San Mateo County, California. As recently pointed out (Howell, Raven, and Rubtsoff, *Fl. S. F.*, p. 4,—1958), "South San Francisco" was a locality-name used in the 1890's for the southeastern part of present-day San Francisco.—J. T. HOWELL.

COMPARISON OF *CARTHAMUS LANATUS* AND *C. BAETICUS* IN CALIFORNIA

	C. LANATUS	C. BAETICUS
Height	20-120 cm.	20-120 cm.
Growth-habit	Open	Compact
Pubescence	Woolly	Puberulent
Head-width	2-3 cm.	1-2 cm.
Head-length	4 cm.	4 cm.
Outer involucrel bracts	Appressed, equal to the head in length, dark green, lanceolate	Patent, twice as long as the head, shiny, green, linear, canaliculate
Spines	Short, weak, at a 60° angle to midvein, grey-green	Long, robust, at a 90° angle to midvein, shiny, green-yellow
Apex of inner bracts	Dark to light purple, intermediate bracts entire to serrate	Light purple, intermediate bracts entire to dentate
Floret-saccation	None to intermediate	Distinct
Corolla-color	Lemon-yellow	Very pale yellow
Anther-color	Yellow	White with a purple stripe on the back of each locule
Pollen-color	Yellow	White
Seeds	Dark, 3 mm. long	Dark, 4 mm. long
Pappus	Chaffy, purple or straw-color, twice as long as seeds	Chaffy, straw-color, three times as long as seeds

successful weedy species. Stands are dense and increasing in size. In Tonner Canyon and adjacent areas in Orange County, the infestations had spread to an area of approximately 2000 acres (personal communication from Dudley). Here, however, 2,4-D appeared promising in its control. Near Stockton it was found

on the edge of the road; it had not invaded the adjacent field that was being irrigated.

Carthamus lanatus seems to be better established in areas adjacent to the Pacific Ocean, and *C. baeticus* in inland areas. The number of locations of both species, however, is too small for definite conclusions in this regard. Both species have been reported as occurring in San Luis Obispo County, though only *C. lanatus* was found in the two locations examined. Mr. T. Chalmers, Agricultural Commissioner, stated that there were 14 separate stands of "distaff thistle" in that county, and one or more of them could have been *C. baeticus*. Robbins (8, 9) referred to the latter in San Luis Obispo County as *C. nitidus* Boiss.

While *C. lanatus* became established as a weed in California prior to 1891, *C. baeticus* appears to have arrived sometime later. The latter was first collected in Tuolumne County in 1927 by Sherrard (CDA), and in 1934 was found over an area of five acres at Tonner Canyon in Orange County (personal correspondence from A. E. Dudley, Deputy Agricultural Commissioner, Orange County).

Descriptions of these two species are given in the table on page 7. The comparative details were obtained from growing plants cultivated at Davis.

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STUDIES IN CIRSIMUM—II*

BY JOHN THOMAS HOWELL

In south central Oregon and perhaps also in adjacent California, there grows a rather tall slender thistle clothed with pale arachnoid tomentum and bearing a loose cymose cluster of rather small or medium-sized heads. This plant was originally described as *Cirsium undulatum* var. *ciliolatum* Henderson (Bull. Torr. Bot. Club 27: 348,—1900) from “dry fields near Ashland, southern Oregon.” Petrak, apparently overlooking Henderson’s name, gave the plant two new names: *C. Botrys* (Beih. Bot. Centralbl. 35: 483,—1917), basing the name on a collection made by L. E. Smith reputedly at Montague, Siskiyou County, California; and *C. Howellii* (ibid., 486), basing the name on a collection made by Thomas Howell in the Rogue River valley, Oregon, in 1887. This plant appears to be a distinct species but Petrak’s names are antedated by one in *Carduus* which is here transferred to *Cirsium*: ***Cirsium ciliolatum*** (Henderson) J. T. Howell, comb. nov. *Cirsium undulatum* var. *ciliolatum* Henderson, l.c.; *Carduus ciliolatus* Heller, Muhlenbergia 1:5 (1900).

In 1952 I went to Montague to look for *C. Botrys* but found only *C. cymosum* (Greene) J. T. Howell and *C. pastoris* J. T. Howell. Since Leland E. Smith is known to have collected in southern Oregon as well as in northern California (cf. Leaflet West. Bot. 8: 99,—1957) and since there are several collections of *C. ciliolatum* from southern Oregon, I believe that there is some likelihood that the type of *C. Botrys* may also have come from southern Oregon and was subsequently mislabeled.

* * *

Cirsium callilepis (Greene) Jepson is the oldest name applicable to the slender-stemmed Pacific Coast thistle in which the phyllaries become more or less scarious-chartaceous in their upper part and the margin is erose, irregularly lacerate-dentate, or pectinate. Although Greene at first stated that the specimen from which he drew his original description came from “western California; probably Humboldt Co. . . .” (Proc. Acad. Nat. Sci. Philad. 1892: 358,—1893), he later modified his locality data to “Mt. Tamalpais and northward, along the coast” (Fl. Francis.

* My earlier paper on *Cirsium* was the last of three sections in *Sertulum Greeneanum* (Amer. Midl. Nat. 30:29–39,—1943).

477,—1897). It is in the central California Coast Ranges in the vicinity of San Francisco Bay where plants grow that agree most closely with Greene's original description and it was to plants of this region that Jepson applied his names (Fl. W. Mid. Calif. 508,—1901; Man. Fl. Pl. Calif. 1164,—1925).

Since the original collection on which Greene based his name is not known to exist, the following specimen is here proposed to typify this species: *J. T. Howell 21906*, Meadows Club on the north side of Mt. Tamalpais, Marin County, California, May 19, 1946 (CAS Herb. No. 365,919).

It should be noted that Petrak (Beih. Bot. Centralbl. 35:305, 306,—1917) applied the name, *Cirsium callilepis*, to a quite different plant from Del Norte County, California, using collections of Alice Eastwood (CAS) as a basis for his diagnosis. This plant is referable to *C. acanthodontum* Blake (*C. oreganum* Piper) and it was again described from Humboldt County, California, as *C. remotifolium* var. *rivulare* Jepson (Man. Fl. Pl. Calif. 1164,—1925). The plant we here call *C. callilepis* would have been treated by Petrak (ibid., 294—301) as a variant of *C. remotifolium* (Hook.) DC. Two of these variants are here transferred to *C. callilepis*:

Cirsium callilepis* var. *oregonense (Petrak) J. T. Howell, comb. nov. *C. remotifolium* subsp. *oregonense* Petrak, Beih. Bot. Centralbl. 35: 300 (1917). Type collection: *Cusick 2692*, collected at Camp Polk, Crook County, Oregon, July 22, 1901.

Cirsium callilepis* var. *pseudocarlinoides (Petrak) J. T. Howell, comb. nov. *C. remotifolium* subsp. *pseudocarlinoides* Petrak, ibid., 297. Type collected on Mt. Tamalpais, Marin County, California, by Evelina Cannon (CAS). This is the first of four collections cited by Petrak (p. 298) and is the one I indicated as type in 1941 (in herb.) and later published (Wasmann Jour. Biol. 11:248,—1953). Petrak apparently never saw the Bolander collection proposed by Cronquist as lectotype of Petrak's subspecies (Vascular Plants Pac. NW. 5: 137,—1955).

* * *

Heretofore I have regarded *Cirsium hydrophilum* (Greene) Jepson of the Suisun Marshes and *C. Vaseyi* (Gray) Jepson of the Mt. Tamalpais area as two species (Amer. Midl. Nat. 30: 33—35,—1943; Marin Fl. 287,—1949). Although Mason (under *C. "hydrophyllum,"* Fl. Calif. Marshes 803, 804,—1957) also indicates the two plants as species, in more recent studies I have

not been able to discern more than a varietal distinction. Under the erroneously formed name *C. Vaseyi* var. *hydrophilum*, Jepson (Man. Fl. Pl. Calif. 1165, —1925) does not even distinguish the plants varietally, although the habitats in which the two grow are so different, the Suisun thistle along brackish sloughs of an estuarine marsh, the Tamalpais thistle about springs on serpentine. I have already discussed Gray's confusing variety (Amer. Midl. Nat., l.c.) and proposed a disposition of its several elements that would make Jepson's *C. Vaseyi* var. *hydrophilum* as unacceptable phytogeographically as his name is incongruous taxonomically. The Tamalpais thistle, "the plant of Vasey's collecting," with its more widely branching habit, somewhat more glabrous herbage, and slightly larger heads, may be known as ***Cirsium hydrophilum* var. *Vaseyi*** (Gray) J. T. Howell, comb. nov. *Cnicus Brewerii* var. *Vaseyi* Gray, Synop. Fl. N. Amer. 1, pt. 2:404 (1884). *Cirsium montigenum* Petrak, Beih. Bot. Centralbl. 35:454 (1917). *Cirsium Vaseyi* (Gray) Jepson, Man. Fl. Pl. Calif. 1165 (1925).

* * *

Through the kindness of Dr. Charles Baehni, Director, and the cooperation of Simone Vautier, Curator, I have been privileged to borrow some critical fragments from the type of *Cirsium Douglasii* DC. and to receive a photograph of the type which is preserved in herb. DeCandolle. in Geneva. This material has shown that *C. Douglasii* is not to be confused with *C. undulatum* (Nutt.) Spreng. as was done by Nuttall (Trans. Amer. Philos. Soc. n. ser. 7:419,—1841) and by Gray (Proc. Amer. Acad. 10:42, 43,—1875), but that it is the plant of the central California Coast Ranges that has been called *C. Brewerii* var. *Wrangelii* Petrak (Beih. Bot. Centralbl. 35:461,—1917). The montane and interior variant of *C. Douglasii* that has usually been regarded as typical *C. Brewerii* may now be known as ***Cirsium Douglasii* var. *canescens*** (Petrak) J. T. Howell, comb. nov. (*Cnicus Brewerii* Gray, Proc. Amer. Acad. 10:43,—1874; *Cirsium Brewerii* (Gray) Jepson, Fl. W. Mid. Calif. 507,—1901; *Cirsium Brewerii* var. *canescens* Petrak, Beih. Bot. Centralbl. 35:462,—1917.) As the type of Petrak's variety, I select the following: *Eastwood 1199*, collected at Sisson, Siskiyou County, California, Aug. 17, 1912 (CAS Herb. No. 5948, 5955), the first of three collections cited by Petrak. Appropriately enough, the vicinity of Sisson ("Strawberry Valley") is also the

type locality of *Cnicus Breweri*.

The photograph of the type of *Cirsium Douglasii* in herb. DeCandolle. shows part of a leaf and a short branchlet bearing a cluster of heads subtended by reduced upper leaves. To one acquainted with the size of the rosette-leaves of *C. Douglasii*, it is immediately obvious that only 4 dm. of the outer part of one of these large leaves is represented. (For example, the basal leaf that is part of *Howell* 23286 from Marin County is 11 dm. long of which about 3 dm. is the slender petiole-like base.) The arrangement of uppermost leaves and heads of the branchlet is quite characteristic of the Coast Range plants of *C. Douglasii*. The label on the sheet is the characteristic printed label: "California. Douglas 1833," and it also bears the number 68 in script.

The fragments of *Cirsium Douglasii* sent on loan were quite ample. The leaf-fragment was clothed above and below with a dense lanate tomentum beneath which along the veins could be seen the almost hidden crispy puberulence as is characteristic in the species. The involucre was about 1.5 cm. long (to about 2 cm. in the photograph) and was made up of numerous well-imbricate phyllaries, appressed except near the tip, the upper part darkened and with a conspicuous median glandular ridge, the shortly spreading tip attenuate into a slender yellowish spine 3–4 mm. long, the outer phyllaries ovate, the middle ovate-lanceolate, the inner oblongish. Two corollas measured 20 and 21.5 mm. in length: tube slender, 7 and 7.5 mm., throat ampliate, 8 and 9.5 mm., and lobes 5 and 4.5 mm. The anther-tips were deltoid and rather pointed, not acuminate. The pappus was 1.5–2 cm. long, some of the bristles conspicuously clavellate.

It is always intriguing to speculate where in California Douglas may have collected his plants and I have considered the problem in connection with *Cirsium Douglasii*. The type specimen was probably collected in June or July in 1831 or 1832 (the 1833 date on the Douglas labels is discussed in Leaflet West. Bot. 2:60, footnote). In July, 1831, Douglas went from Monterey to Sonoma (cf. Leaflet West. Bot. 3:161) and the thistle might well have been collected on that trip. On the other hand, it may have been collected somewhere in the same general region of California in the summer of 1832 since Douglas remained in California until August of that year (Leaflet West. Bot. 2:59, footnote). Since Monterey was the center of Douglas' move-

ments in California and since he spent so much more time there than anywhere else, the plant may have been collected near there. *Cirsium Douglasii* is not known from Monterey or from the Santa Lucia Mts. to the south, but it has been found at Castroville, Monterey County (*Elmer* 4408, June, 1903, CAS, etc.), about 12 miles northeast of Monterey, and from there, in an interrupted way, northward and eastward through the Coast Ranges as far as Santa Rosa Creek, Sonoma County, to the eastward, and at least as far as Mendocino County along the coast.

* * *

Also from Geneva I have been privileged to borrow the type of *Cirsium utahense* Petrak (Beih. Bot. Centralbl. 35:470,—1917). This loan was requested because of certain discrepancies between Petrak's original description and the isotype which I had borrowed earlier from the Pomona College Herbarium (POM). The collection number given by Petrak is "Marcus E. Jones Nr. 3163b," whereas the number on the isotype is 5163q. This difference in numbers assumed critical proportions when the phyllaries in the isotype were found to be glandular, although Petrak not only omits mention of glands in his detailed diagnosis but in defining his group *Novo-Mexicana* (p. 466) to which *C. utahense* belongs he emphatically writes: "Involucri foliola dorso numquam viscido-carinata." (Petrak makes no mention of glands under *Novo-Mexicana* in his "Systematische Übersicht" on page 267.)

Comparison of type and isotype labels quickly cleared up the difficulty: the correct collection number is 5163q, Petrak's mistake being due, at least in part, to a blurring of the number on the type label. The examination of the involucre disclosed that in the type all except the outer and inner phyllaries bear a more or less well-developed median glandular ridge. The following notes were taken from the type:

Heads 3 cm. high, 4-5 cm. broad pressed; involucre about 2 cm. high, the phyllaries in about 6 series rather loosely imbricate, moderately arachnoid-tomentose, the outer phyllaries rather short, spreading or ascending, not distinctly reflexed, appressed to above the middle, the free tip more or less ascending, narrowed into a stiffish spine about 3 mm. long, the middle phyllaries appressed at base to above middle, the free part spreading a little and then ascending, the base cartilaginous, the free part herbaceous, thickish, attenuate into a stiff spine 3-5 (or 7) mm. long, the inner phyllaries gradually attenuate into a flat outwardly curving tip, the tip chartaceous, stramineous, weakly spinescent, scarcely ciliolate, all phyllaries except the

outer and inner with a more or less well-developed median glandular ridge; flowers spreading in the head, corolla-tube 11 mm. long, throat ampliate, 4 mm. long, lobes 9 mm. long; anther-tips shortly and abruptly subulate; pappus about 2 cm. long, bristles slightly enlarged at tip, the outer bristles in head barbellulate, the inner plumose.

* * *

Even though it may not be possible to determine positively the specific identity of many plants intermediate between the several species, I still believe that our thistles belonging to the *Cirsium occidentale* complex should be separated into three species as was proposed by Greene in 1893 under the generic name *Carduus* (Proc. Philad. Acad. Nat. Sci. 1892:358, 359). Two of these have already been named in *Cirsium* (*C. occidentale* and *C. pastoris*) but there yet remains the widespread, highly variable, red-flowered thistle of our drier California hills and mountains. This I rename now: ***Cirsium proteanum*** J. T. Howell, nom. nov. *Carduus venustus* Greene, l.c., p. 359. *Cirsium occidentale* ssp. *venustum* (Greene) Petrak, Beih. Bot. Centralbl. 35:493 (1917). *Cirsium occidentale* var. *venustum* (Greene) Jepson, Man. Fl. Pl. Calif. 1167 (1925). *Cirsium Coulteri* of Calif. authors, not of Harvey & Gray. Not *Cirsium venustum* Porta.

It was through the generous cooperation of Dr. D. A. Webb, Director of the Herbarium at Trinity College in Dublin, that I have been able to examine the type of *Cirsium Coulteri* Harvey & Gray. The specimen is referable to typical *Cirsium occidentale* (Nutt.) Jepson in the restricted sense, just as Greene interpreted that species (l.c., p. 358, as *Carduus occidentalis* Nutt.) and as I am here accepting it.

The type of *Cirsium Coulteri* consists of a short piece of stem with parts of broken leaves attached and of a second stem with two elongate branches each bearing a much-flattened fruiting head. The printed label merely states: "California. Dr. Coulter." It bears in script the number 367 and the name "*Cirsium Coulteri* Harv. & Gr." Notes taken from the type follow:

Stems white-arachnoid-tomentose, tomentum a little deciduous; leaves (cauline only) sessile and shortly auriculate, white-arachnoid-tomentose below, the tomentum thin enough so that the color of leaf shows through, the upper surface glabrescent or nearly so, sparsely and weakly spiny, the spines on the margins not very stout and not very numerous; heads (2) mature, solitary at the ends of sparsely leafy peduncle-like stems; involucre 4 cm. long, arachnoid-tomentose, tomentum more or less floccose, the lowest phyllaries 0.5-1 cm. long, reflexed and downward pointing from near base, linear-

attenuate from base to spine-tipped apex, all of the other phyllaries spreading or ascending or erect, the phyllaries above the lowest ones spreading horizontally from a short, appressed base, the whole gradually narrowed from the base, the spreading part thickish and subterete, linear and attenuate into the slender stiffish spine, the middle phyllaries the same but becoming more erect, the innermost phyllaries flattened toward the tip, sharply acute or weakly spine-tipped, spinulose-ciliate and a little twisted; corolla 3.2 cm. long, the tube gradually widened into the throat, the lobes 0.9–1.1 cm. long, 0.2–0.25 mm. wide, linear, appearing filiform-linear due to inrolling of margins, the very tip of lobes drawn out into a short (about 0.5 mm.) subulate point; anther-tip subulate, about 0.3 mm. long; achenes (3 measured) 5, 5.2, and 5.5 mm. long, about 2.66 mm. wide, cuneate-obovate, strongly flattened, brown, slightly shiny, finely tuberculate-rugulose; pappus 2.5 cm. long, pale whitish-buff, the bristle-tips not enlarged but gradually attenuate, the plumose hairs extending nearly to base of bristle, the hairs becoming shorter near the tip and then ciliate, and then merely barbellulate.

Such a plant might have been collected by Coulter either at Monterey or Santa Barbara. Out of more than 60 collections of *Cirsium occidentale* sens. strict. in the California Academy of Sciences Herbarium the specimen most like (truly remarkably like!) the Coulter plant is the one collected by Henry M. Pollard on June 5, 1952, at Santa Barbara (on the Hope Ranch near the Laguna Blanca School). The type of *Carduus occidentalis* Nutt. was collected "round St. Barbara" and the type of Coulter's thistle may have come from there, too.

NEW STATUS FOR THREE WESTERN CARICES

BY F. J. HERMANN

The reviewing of a large amount of material of Wyoming sedges for the preparation of an account of *Carex* to be issued in the current series "Contributions toward a Flora of Wyoming," edited by Professor C. L. Porter, indicated such an absence of sharp, constant demarcation between two pairs of supposed species and the lack of evident geographic segregation in another taxon, that the following changes in status appear to be requisite.

Carex phaeocephala* f. *Eastwoodiana (Stacey) F. J. Hermann, stat. nov. *C. Eastwoodiana* Stacey, Leaflet West. Bot. 2: 121 (1938).

Although Stacey distinguished his *C. Eastwoodiana* from *C. phaeocephala* Piper on the basis of perigynia strongly nerved ventrally and tapering into the beak (as contrasted with peri-

gynia nerveless ventrally and abruptly contracted into the beak in *C. phaeocephala*), it was found in the present study that often the perigynia, though ventrally nerved, are abruptly contracted into a short beak, or again that they may gradually taper into the beak but be quite nerveless ventrally. Typically the perigynium of *C. phaeocephala* is broadest above the middle, whereas in *C. Eastwoodiana* it is broadest at or below the middle, but this distinction too is very unstable, so that the prevalence of intermediates between the two taxa requires the reduction of *C. Eastwoodiana* to an infraspecific category for its practicable handling. Mr. Stacey had seen specimens from Montana, Idaho, Utah, Oregon, and Washington at the time of its description and later reported it from Wyoming. It also occurs in California (Mono County, *R. F. Hoover 5554*), so is now known from so nearly the full extent of the range of *C. phaeocephala* that formal status appears to be more appropriate for it than varietal.

Carex pachystachya f. **Monds-Coulteri** (Kelso) F. J. Hermann, stat. nov. *C. pachystachya* var. *Monds-Coulteri* Kelso, Biol. Leaflet No. 64:2 (1953).

Described from Colorado material only, this form of *C. pachystachya* Cham. with ventrally nerved perigynia occurs also in at least Wyoming, Montana, Oregon, and British Columbia, so that it seems probable that its range eventually will be found to be essentially co-extensive with that of *C. pachystachya*.

Carex scopulorum var. **bracteosa** (Bailey) F. J. Hermann, trans. nov. *C. vulgaris* var. *bracteosa* Bailey, Proc. Amer. Acad. 22:81 (1886). *C. gymnoclada* Holm, Amer. Jour. Sci. 14:424 (1902).

Holm, in the publication of *C. gymnoclada*, does not compare it with his *C. scopulorum* but only with *C. Tolmiei* Boott of section *Atratae*. Mackenzie's distinctions (N. Amer. Fl. 18:376, —1935) between the two (mainly that of "dried first-year leaf-blades at base of fertile culms stiff, rigid and conspicuous, concealing the base of the culms" in *C. scopulorum* vs. "dried first-year leaf-blades at base of fertile culms much desiccated, not stiff, rigid and concealing the base of the culms") are so inconstant, representing tendencies only, although well-marked extremes do occasionally occur, that varietal status appears to be the natural category for *C. gymnoclada*.

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DISTRIBUTIONAL DATA ON WEEDY
THISTLES IN WESTERN NORTH AMERICA

BY JOHN THOMAS HOWELL

In the summer and fall of 1952, as an aid toward the preparation of a treatment of the Thistle Tribe of the *Compositae* for Abrams' Illustrated Flora of the Pacific States, I did field work in Washington, Oregon, and California, and visited most of the herbaria in those states. Although geographic ranges have been drawn up for my floristic account from what I learned, most of the detailed distributional data that were brought together could not be cited because of style- and space-limitations. Hence, because of the economic as well as the phytogeographic interest attached to the introduced weedy members of the Thistle Tribe in our area, I have prepared a synopsis of the distributional data which I collected, amplified by reports in western North American floras and supplemented by more recent collections that have come to my attention. Detailed records are given for the states bordering the Pacific Ocean from British Columbia to Baja California, with incidental or more detailed reports as far east as the Rocky Mountain states and Texas. Notes on early collection-records, while not complete or final, are given as an aid or clue to those who may be concerned with the historic aspects of the introduction and spread of alien plants. Collections in the following institutions have been examined:

Agronomy Sub-herbarium, University of British Columbia, Vancouver (BC)

Provincial Museum, Victoria, British Columbia (V)

California Academy of Sciences (CAS)

California Department of Agriculture, Sacramento (Sac)

California Polytechnic College, San Luis Obispo (CP)

Dudley Herbarium, Stanford University (DS)

University of California, Berkeley (UC)

University of California, Davis (UC, Davis)

Jepson Herbarium, University of California, Berkeley (J)

Oregon State College, Corvallis (OSC)

University of Oregon, Eugene (UO)

University of Idaho, Moscow (I)

Pomona College, Claremont (P)

Rancho Santa Ana Botanic Garden, Claremont (RSA)

San Diego Natural History Museum (SD)

Santa Barbara Museum of Natural History (SB)
 State College of Washington, Pullman (WS, WSC)
 University of Washington, Seattle (UW)
 Willamette University, Salem (W).

ACKNOWLEDGEMENTS. To those in charge of the herbaria listed I am grateful for the privilege I have had in studying collections. Especially I wish to thank Mrs. M. K. Bellue, Mrs. G. C. Fleischman, Dr. T. C. Fuller, and Dr. H. M. Gilkey for their help and interest. In the genus *Centaurea* I also had the critical help of Dr. E. Asplund of Stockholm, Sweden, and of Mr. N. Y. Sandwith and Dr. W. B. Turrill of Kew, England. Dr. A. C. Cronquist helped in two ways, first by his critical determinations in Oregon and Washington herbaria, and second by his expert treatment of the Thistle Tribe in the northwestern United States (Vas. Pl. Pac. NW., vol. 5, pp. 1-343,—1955).

Arctium

1. Inner involucre bracts usually green, the margins ciliate with small reflexed or outwardly pointing hairs; pappus-bristles 4-6 mm. long 1. *A. Lappa*
1. Inner involucre bracts usually purplish-tinged, the margins serrulate with very fine upwardly pointing crustaceous teeth; pappus-bristles mostly 1.5-3 mm. long. 2. *A. minus*

1. **Arctium Lappa** L. BRITISH COLUMBIA: acc. Henry, p. 322. CALIFORNIA: Alameda, Los Angeles, Riverside, San Benito, Santa Clara, and Yolo counties; Carmel Valley, acc. Jepson (1925, p. 1168); possibly in Santa Barbara County, acc. C. F. Smith (1952, p. 73). OREGON: no plant typical of *A. Lappa* has been seen from Oregon. WASHINGTON: Klickitat and Pierce counties (WSC).

Early collections: Riverside, Riverside County, California, *Reed 1435*, June, 1907 (P); Niles, Alameda County, California, *Tyson in 1910* (UC); Bingen, Klickitat County, Washington, *Suksdorf in 1915* (WSC).

2. **Arctium minus** (Hill) Bernh. BRITISH COLUMBIA: several collections from the western part. CALIFORNIA: Del Norte, Humboldt, Mendocino, Santa Cruz, Siskiyou, and Nevada counties; Kings County and "at San Francisco Bay," acc. Weeds of Calif. (1951, p. 427). IDAHO: Ada, Blaine, Bonner, Cassia, and Owyhee counties. NEVADA: Las Vegas (CAS). OREGON: Benton, Clackamas, Clatsop, Lane, Marion, Multnomah, and Umatilla counties. WASHINGTON: Clark, Cowlitz, Kittitas, Klickitat, Mason, San Juan, Skagit, Skamania, Snohomish, Spokane, Thurston, and Whitman counties. Also in Colorado.

Two kinds of plants are here treated as *A. minus*: the first with smaller heads (about 2 cm. broad) that are racemously arranged along fastigiate erect branches, the second with somewhat larger heads (about 3 cm. broad) that are loosely or compactly corymbose-paniculate or racemose. The former is typical of *A. minus*; the second may be what has been referred to *A.*

nemorosum in the eastern United States, but it does not agree with the plant described as *A. nemorosum* in Europe. Distinct as these two are in extreme forms, they intergrade completely and I believe there would be no advantage in attempting to separate them. Both forms occur throughout the range of the species on the Pacific coast, but the second form is much rarer.

The earliest western collection of *A. minus* that I have seen is that of Henderson from the "streets of Portland," Sept. 10, 1881 (UO). Another early Oregon collection is that of Standlee from Benton County in 1900 (OSC). The earliest California collection seen was made by Davy near Ferndale, Humboldt County, in 1899 (UC).

Carduus

1. Plants annual; heads cylindric, 1.5–2.5 cm. long, 1–1.5 cm. wide, rather few-flowered; involucre bracts spreading slightly near the top. 2
1. Plants biennial; heads broadly campanulate or hemispheric, 1.5–5 cm. long, 1.5–8 cm. wide, many-flowered; involucre bracts strongly spreading or reflexed near the middle. 3
2. Involucre bracts more or less scarious-margined, the tips glabrous and smooth except on the subciliate margin. 1. *C. tenuiflorus*
2. Involucre bracts not scarious-margined, the tips roughened on the margin and back by short upwardly appressed trichomes. 2. *C. pycnocephalus*
3. Heads nodding, large, mostly 4–8 cm. broad; pappus 1.5–2.5 cm. long. 3. *C. nutans*
3. Heads erect, medium or smaller, 1.5–3 cm. broad; pappus 1–1.5 cm. long. 4. *C. acanthoides*

1. *Carduus tenuiflorus* Curtis. CALIFORNIA: Alameda, Contra Costa, Humboldt, Marin, Mendocino, San Benito, San Francisco, San Mateo, Santa Clara, Santa Cruz, and Stanislaus cos.; Mariposa Co. and "Siskiyou to Riverside County," acc. Weeds of Calif. (1951, p. 433). OREGON: Coos County. TEXAS: reported as *C. pycnocephalus* by Cory (Madroño 5:201). The earliest California record is *Eastwood 1654*, collected in 1912 at Fort Bragg, Mendocino County (CAS).

2. *Carduus pycnocephalus* L. CALIFORNIA: Alameda, Contra Costa, Eldorado, Marin, Napa, San Diego, San Francisco, San Luis Obispo, Santa Barbara, Solano, and Sonoma counties. OREGON: Eugene, Lane County, *Fletcher in 1929* (OSC); probably a waif that did not persist. The first-known California collection was made on the Marina, San Francisco, *Goodman in 1920* (CAS). For an account of the genus *Carduus* in California, see Leaflet West. Bot. 3: 212–213.

3. *Carduus nutans* L. ARIZONA: between Lukachukai and Fort Defiance, Apache County, *Eastwood & Howell 6814* in 1938 (CAS); Ganado Dam, Apache County, *Deaver 3992* in 1952 (CAS). BRITISH COLUMBIA: Alexis Creek, Chilcotin, *Eastham 17550* in 1944 (V). CALIFORNIA: Walnut, Los Angeles County, *Garrettson* in 1954. IDAHO: Bonneville and Caribou counties. NEVADA: in marshy grassy meadow, Lida, Esmeralda County, *Ferris 12543* in 1952 (DS). OREGON: Linnton ballast grounds, Multnomah

County, Gorman in 1916, J. C. Nelson, Suksdorf, and perhaps others. WASHINGTON: east of Colfax, Whitman County (WSC); Sumas, Whatcom County, Muenscher 8493 in 1937 (UC, WSC). Also in Colorado, Montana, and Texas.

4. *Carduus acanthoides* L. COLORADO: road between Aspen and Ashcroft, Pitkin County, Penland 4359 (Colorado College Herb.). IDAHO: along road above Lake Waha, Nez Perce County, Ownbey & Cronquist 5633 in 1948 (CAS, RSA, WSC).

Carthamus

1. Leaves and outer involucre bracts spinulose-serrate or sometimes entire; stems and leaves glabrous.....1. *C. tinctorius*
1. Leaves and outer involucre bracts pinnately parted or lobed, rigidly spinose; stems and leaves more or less glandular-pubescent and archnoid, especially near the inflorescence.....2
2. Heads broadly ovate, the involucre bracts shorter or a little longer than the flowers.....2. *C. lanatus*
2. Heads narrowly ovate or oblongish, the outer involucre bracts attenuate and much longer than the flowers.....3. *C. baeticus*

1. *Carthamus tinctorius* L. ARIZONA: Tucson, Thornber 365 in 1903 (P). CALIFORNIA: Kern, Kings, Los Angeles, Sacramento, San Benito, San Joaquin, Santa Barbara, Solano, and Tulare counties (cf. Madroño 2:24; Weeds of Calif., 1951, p. 436; Leaflet West. Bot. 9:5). All collections probably represent fugitives from cultivation since the plant does not seem to persist in a naturalized state.

2. *Carthamus lanatus* L. CALIFORNIA: Marin, Nevada, San Francisco, San Mateo (?), and Santa Clara counties; San Luis Obispo and Sonoma counties acc. Ashri and Knowles (1959). The earliest California collections that have been seen are those of T. S. Brandegee in 1891 from San Francisco (DS) and E. Cannon in 1894 from the southeastern part of San Francisco (CAS).

3. *Carthamus baeticus* (Boiss. & Reut.) Nyman. *C. nitidus* of Calif. refs., not Boiss. CALIFORNIA: Los Angeles, Orange, San Diego, San Joaquin (according to Ashri and Knowles), San Luis Obispo, and Tuolumne counties. This plant is related to *C. lanatus* and has been treated as a variety of that species by some European botanists (cf. Leaflet West. Bot. 4:161-163). Ashri has shown, however, that the two are cytologically distinct with $n=22$ in *C. lanatus* and $n=32$ in *C. baeticus* (cf. Ashri and Knowles, 1959).

Centaurea

1. Flowers purple, blue, pink, or white (sometimes also yellow in *C. Moschata*); stems more or less angled but not winged.....2
1. Flowers yellow; stems winged by the decurrent leaf-bases. Involucre bracts strongly spine-tipped; outer sterile flowers with inconspicuous corollas; achenes smooth; innermost pappus-bristles abbreviated if pappus is present.....17
2. Pappus-bristles numerous, subplumose, deciduous, the innermost the longest and to 1 cm. long. Involucre bracts scarious-margined, neither spine-tipped nor pectinately fringed; flowers perfect.....1. *C. repens*
2. Pappus-bristles, if present, persistent, frequently paleaceous, 5 mm. long or less.....3

3. Pappus present, the innermost paleaceous bristles the longest, 3–3.5 mm. long 4
3. Pappus present or absent, if present then the outermost scales longest and the innermost shortest 6
4. Involucral bracts rounded at the tip, not spiny; achenes nearly smooth, blackish, villous-pubescent 2. *C. Moschata*
4. Involucral bracts more or less spiny-tipped; achenes rugulose or pitted between longitudinal ribs 5
5. Plants annual; middle involucral bracts tipped by a spreading or reflexed spine 2–5 mm. long; outer flowers sterile and much enlarged 3. *C. muricata*
5. Plants perennial; middle involucral bracts tipped by a short spinose mucro 0.5 mm. long or less; flowers perfect, the outer not enlarged 4. *C. salmantica*
6. Pappus 4–5 mm. long, longer than the achene; heads rather large, 2.5–4 cm. long 7
6. Pappus none, or if present, 4 mm. long or less and equaling the achene or shorter 8
7. Plants densely or thinly white-tomentose; leaves mostly bipinnate, the segments linear-oblong; involucral bracts pectinate-ciliate, the terminal seta spinose but less than 1 mm. long 5. *C. Cineraria*
7. Plants green, glabrous or thinly pubescent; leaves entire or dentate to irregularly pinnate or pinnatifid, the segments oblong to ovate; involucral bracts scarious, lacerate-pectinate, the appendage palmate-spinose, the central spine 1–2 mm. long 6. *C. diluta*
8. Involucral bracts with a long or short terminal spine 9
8. Involucral bracts not spine-tipped 12
9. Heads 2–3 cm. long; involucral spines stout and spreading, 1–3 cm. long. Flowers pink to purple 10
9. Heads 1–1.5 cm. long, narrowly oblong-ovate; involucral spines short and squarrose, 1–3 mm. long 11
10. Pappus present, the paleaceous bristles 1–2 mm. long 7. *C. iberica*
10. Pappus none 8. *C. Calcitrapa*
11. Plants biennial; flowers white or sometimes pink; achenes 2.5 mm. long; pappus none or if present less than 1 mm. long 9. *C. diffusa*
11. Plants perennial; flowers lavender or pinkish; achenes 2.5–3.5 mm. long; pappus to 2.5 mm. long 10. *C. virgata*
12. Pappus 2–4 mm. long, equaling the achene or somewhat shorter; heads 1.5–2 cm. long 13
12. Pappus none or if present generally 1 mm. long or less and much shorter than the achene; heads generally 2 cm. long or more. Plants perennial; leaves oblanceolate or elliptic, few-lobed or entire 14
13. Plants annual; leaves simple or pinnate, the blades or lobes oblanceolate or linear; outermost corollas much enlarged, palmately oblique, showy, generally blue or purplish, rarely white or pink; achenes 4 mm. long 11. *C. Cyanus*
13. Plants biennial or perennial; leaves pinnately or bipinnately parted or divided; outermost corollas sterile but not conspicuously enlarged, pink or rarely white; achenes 3 mm. long 12. *C. maculosa*

14. Appendages of middle involuclral bracts broad and rounded, scarious, lacerate, not pectinate, covering the base of the bracts. Sterile marginal flowers enlarged; pappus none or represented by small scales... 13. *C. Jacea*
14. Appendages of middle involuclral bracts pectinate-fringed.....15
15. Involucre cylindric, longer than wide; appendage of middle bracts small, not entirely covering the base of the bracts; sterile marginal flowers enlarged; pappus reduced to minute scales or none..16. *C. nigrescens*
15. Involucre as wide as long; appendage of middle bracts large, completely covering the base of the bracts.....16
16. Appendages of involuclral bracts light to dark brown; sterile marginal flowers with radiately enlarged corollas.....14. *C. pratensis*
16. Appendages of involuclral bracts blackish; sterile marginal flowers lacking.15. *C. nigra*
17. Heads 1.5–2 cm. long; achenes 2.5–3 mm. long; pappus, if present, white or light brown, to 4 mm. long.....18
17. Heads 2–3 cm. long; achenes 4–5 mm. long; pappus reddish, dark brown, or black, 5–10 mm. long.....19
18. Heads about 1.5 cm. long; spines on the middle involuclral bracts 0.5–1 cm. long, slender, purplish- or brownish-tinged.....17. *C. melitensis*
18. Heads about 2 cm. long; spines on the middle involuclral bracts 1–2 cm. long, stout, yellow.....18. *C. solstitialis*
19. Involucre nearly glabrous; appendages on the middle bracts palmately spinose, the central spine 2–2.5 cm. long.....19. *C. sulphurea*
19. Involucre conspicuously arachnoid-tomentose; appendages on the middle bracts pinnately spinose, the spine 1–2 cm. long.....20. *C. eriophora*

1. *Centaurea repens* L. *C. Picris* Pall. ARIZONA: reported from 5 counties (Ariz. Fl. p. 956). BRITISH COLUMBIA: Kamloops, *Brink & Atkinson in 1952* (BC, CAS); Keremeos, *Brink & Atkinson in 1952* (BC, CAS); "a pernicious and persistent weed" (Eastham, 1947, p. 108). CALIFORNIA: collections or records seen from 21 counties from Lassen County and the Sacramento Valley south to San Diego and Imperial counties. NEVADA: Charleston Mountains (CAS); near Reno (DS). OREGON: Baker, Crook, Gilliam, Jackson, Klamath, Malheur, and Sherman counties. WASHINGTON: collections seen from 12 counties, all east of the Cascade Mountains. Specimens or records also from Colorado, Idaho, Montana, New Mexico, Texas, Utah, Wyoming, and Sonora, Mexico.

The earliest western records noted are from California: Buttonwillow, Kern County, *Evermann in 1914* (CAS); Metz, Monterey County, *Hickman in 1919* (CAS); Artesia, Los Angeles County, in 1919, acc. Davidson and Moxley (1923, p. 441).

2. *Centaurea Moschata* L. The sweet sultan, an old-fashioned garden annual with large yellow, purplish, or white heads, may persist spontaneously in the vicinity of garden patches, as in Santa Barbara, California, *Pollard in 1955* (CAS).

3. *Centaurea muricata* L. Locally but persistently established as an escape from cultivation in Santa Barbara, California: *Wm. Kellogg*, Apr. 25, 1904 (UC); *Eastwood*, May, 1908, (CAS); Carillo and Laguna streets, *T. Payne*, June 8, 1935 (RSA); same station, *Pollard*, June 5, 1952 (CAS). In 1953 and

1958, Mr. Pollard collected the plant at Laguna and Canyon Perdido streets, and in 1954 at Laguna and Ortega streets. Mr. Pollard noted that his 1958 specimens will be "possibly the last local collection of this *Centaurea*; the only known station soon to be claimed for building." In cultivation, this attractive plant is sometimes known as *Amberboa muricata* (L.) DC.

4. *Centaurea salmantica* L. Known in the California flora only from collections made by Alice King in Healdsburg, Sonoma County: September, 1896 (UC), August, 1897 (DS). In 1948, the plant was collected as a dooryard weed in Jerome, Yavapai County, Arizona, *Goodding 5-48* (CAS).

5. *Centaurea Cineraria* L. Cultivated in California as one of the gray-leaved "dusty millers," occasionally becoming established in California in the vicinity of gardens: hills above Mills College, Alameda County, *J. T. Howell 18159* in 1943 (CAS); Santa Barbara, Santa Barbara County, *H. M. Pollard*, August, 1953; Santa Cruz, Santa Cruz County, *Hesse 1294* (J).

6. *Centaurea diluta* Ait. Known from scattered stations in California: east of Whittier on Whittier Boulevard, Los Angeles County, *E. Johnson*, May 29, 1943 (P), *E. M. Becker*, August, 1943, (CAS, Sac); Watts, at Antwerp and Imperial avenues, Los Angeles County, *G. C. Fleischman in 1952* (CAS); Fox Canyon, Santa Barbara, Santa Barbara Co., *Pollard in 1955* (CAS); edge of the dune area, Pacheco Street at 37th Avenue, San Francisco, *Rubtzoff 1302* in 1952 (CAS); waste ground, 3rd Street near Paul Avenue, San Francisco, *J. T. Howell 31782* in 1956 (CAS).

7. *Centaurea iberica* Trevir. Rare in three widely separated parts of California: Santa Rosa, Sonoma County, in 1929 (UC), in 1932 (CAS); Solvang, Santa Barbara County, in 1924 (P); near Ramona, San Diego County, in 1932 (CAS, DS, RSA, UC); Santa Teresa Valley, San Diego County, in 1938 (SD).

8. *Centaurea Calcitrapa* L. ARIZONA: Yuma (Ariz. Fl. p. 955). BRITISH COLUMBIA: Nanaimo, acc. Henry (1915, p. 322). CALIFORNIA: Lake, Los Angeles, Marin, Napa, San Diego, San Luis Obispo, San Mateo, Santa Clara, Solano, Ventura, and Yolo counties. OREGON: Linnton, Multnomah County, *Gorman 4762* in 1919 (CAS, DS), *J. C. Nelson 2902* in 1919 (WS). WASHINGTON: Ellensburg, Kittitas County (WS).

The earliest California collection seen is that made by Jepson at Vacaville, Solano County, August 12, 1887.

A purple star-thistle related to *C. Calcitrapa* that has been collected on the Fuller Ranch near Corona, Riverside County, California, may be *C. calcitrapoides* L. In this material the outer achenes are without pappus, the inner with pappus: *Howie in 1952* (CAS); *J. T. Howell 28864* (CAS).

9. *Centaurea diffusa* Lamk. BRITISH COLUMBIA: Kamloops, *Brink & Atkinson in 1952* (BC, CAS); Lytton, *Brink & Atkinson in 1952* (BC, CAS); Grand Forks and Okanogan Valley (Eastham, 1947, p. 107). IDAHO: Benewah, Blaine, and Camas counties. OREGON: Gilliam, Union, and Wasco counties. WASHINGTON: Chelan, Grant, Kittitas, Klickitat, Okanogan, Stevens, and Yakima counties.

Although the first-published western report of this species (Leaff. West. Bot. 1:144,—1934) was based on my collection, *No. 7217* (CAS), made July 4, 1931, at The Dalles, Wasco County, Oregon, the earliest western collection

I have seen subsequently is that of Suksdorf, *No.* 5983 (WS), made in an alfalfa field at Bingen, Klickitat County, Washington, August 7, 1907.

10. *Centaurea virgata* Lamk. var. *squarrosa* (Willd.) Boiss. CALIFORNIA: Big Valley, Lassen County, *L. White*, July and August, 1950 (Sac), August, 1950 (CAS); Shasta County (acc. M. K. Bellue, Calif. Dept. Agr. Bull. 41:61,—1952). UTAH: Tintic Junction, Juab County *B. R. Ellison*, August, 1954 (CAS).

11. *Centaurea Cyanus* L. BRITISH COLUMBIA: "a common garden escape," acc. Henry (1915, p. 322). CALIFORNIA: collections seen from 14 counties from Humboldt and Modoc counties south to Los Angeles County. IDAHO: Ada, Bonner, and Latah counties. OREGON: Benton, Curry, Douglas, Grant, and Lane counties; "abundant weed . . . especially west of the Cascade Mts.," acc. Peck (1941, p. 786). WASHINGTON: widespread throughout the state, collections seen from 10 counties. Also reported from Arizona and Texas.

The earliest western collection seen was made by L. F. Henderson from fields, Hood River Valley, Oregon, June 28, 1880 (UO). Henderson also made a collection at Grants Pass, Oregon, in 1886 (UO). The earliest Californian specimen seen was collected by H. P. Chandler, *No.* 633 (UC), on May 21, 1900, in grain fields in the Oakland Hills. Earlier than that, however, Greene in 1897 reported the plant as adventive (*Flora Franciscana*, p. 473, under *Cyanus segetum*).

Centaurea Cyanus var. *denudata* Suksdorf (Werdenda 1:43,—1927), a less hairy minor form, is based on *Suksdorf 10490* from Bingen, Klickitat County, Washington (WS, type; CAS, UC).

12. *Centaurea maculosa* Lamk. BRITISH COLUMBIA: Kamloops, *Brink & Atkinson in 1952* (BC, CAS); Kootenay Lake (UC). IDAHO: Bonner, Clearwater, and Idaho counties. MONTANA: Mineral, Missoula, and Ravalli counties. OREGON: Deschutes County in 1935 (OSC). WASHINGTON: north of Bothell, King County, *Heller 14729* in 1928 (UW); Okanogan and Snohomish counties.

Collections of a star-thistle from Vancouver Island, British Columbia, have been reported as *C. paniculata* L. (Kermode, *Fl. Vancouver and Queen Charlotte islands*, p. 81,—1921), a name subsequently listed among "excluded species" by Eastham (1947, p. 119). It would seem, however, that Kermode's record is correct on the basis of the following collections in Herb. N. Y. Bot. Garden: vicinity of Victoria, *Macoun 552*, August, 1893; Beacon Hill, Victoria, *M. O. Malte*, August, 1912. In these specimens the heads are oblongish, the involucre are narrowed at the base, and the involucre bracts are not spotted, whereas in *C. maculata* the heads are roundish, the involucre rounded or subtruncate at the base, and the bracts strongly spotted.

13. *Centaurea Jacea* L. Rare in waste ground and on the edge of fields: Douglas and Marion counties, Oregon; Whitman County, Washington.

Early collection: between Orville and Independence, Oregon, *J. C. Nelson 3255* in 1920 (WSC).

14. *Centaurea pratensis* Thuill. Occasional or sometimes common along roads and in fields, variable and widespread. BRITISH COLUMBIA: Westwold, *Brink & Atkinson in 1952* (BC, CAS). CALIFORNIA: Del Norte, Humboldt, and Santa Cruz counties. OREGON: Benton, Clackamas, Columbia, Douglas,

Hood River, Josephine, Lane, Marion, Multnomah, and Washington counties. WASHINGTON: Clark, Klickitat, Pierce, San Juan, Snohomish, Thurston, and Wahkiacum counties. Cultivated near Roseburg, Douglas County, Oregon, for winter forage.

Early collections. Eugene, Benton County, Oregon, *Bradshaw*, September, 1917 (UC); near junction of Terwah Creek and Klamath River, Del Norte County, California, *Duncan* 374 in 1920 (DS); near Roche Harbor, San Juan County, Washington, *Peck* 13098 in 1923 (UW).

15. *Centaurea nigra* L. CALIFORNIA: Alameda County. OREGON: Alsea Valley, Benton County, *Sims* in 1952 (CAS, DS, OSC); Columbia and Multnomah counties. WASHINGTON: King, Klickitat, and Okanogan counties.

Early collection: Albina, Oregon, *Suksdorf* 3116 in 1902 (WSC).

16. *Centaurea nigrescens* Willd. IDAHO: Idaho County. OREGON: Hood River County. WASHINGTON: Manchester, Kitsap County, *W. & E. Wheeler* 35 (CAS, DS); also Klickitat and Wahkiakum counties.

Early collection: Adell, Hood River County, Oregon, *Peck* 9886 in 1921 (W).

17. *Centaurea melitensis* L. ARIZONA: reported from 6 counties (Ariz. Fl. p. 955). BAJA CALIFORNIA: El Rosario in 1889 (UC), San Telmo in 1933 (CAS), Guadalupe Island in 1897 (DS), in 1925 (CAS). BRITISH COLUMBIA, acc. Henry (1915, p. 322). CALIFORNIA: commonly naturalized throughout the hills and lower mountains from Del Norte County to San Diego and Imperial counties, records seen from 33 counties and 4 islands off the coast, mostly below 3000 feet elevation. OREGON: Coos, Curry, Douglas, Josephine, Lane, Marion, and Multnomah counties. WASHINGTON: Clallam, Island, Jefferson, Klickitat, and Whatcom counties. Also in New Mexico and Texas.

That the introduction of *C. melitensis* into California occurred during the Spanish-Mexican occupancy is definitely established by the discovery of achenes in the adobe bricks of the dwelling on the La Natividad Rancho near Salinas in Monterey County (cf. Hendry and Kelly, Calif. Hist. Soc. Quart. 4:361-373,—1925). This building "was probably erected prior to 1840" (p. 370). Bentham records that Hartweg found the plant common in fields near the Carmel and Santa Cruz missions in 1846 or 1847 (*Plantae Hartwegianae* 294, 320,—1849).

Other early records. ARIZONA: Santa Cruz Valley near Tucson in 1881 (CAS). CALIFORNIA: Monterey in 1861 (UC); San Diego in 1874 (SD); Big Meadows, Plumas County, *Cleveland* in 1879 (SD). OREGON: Sauviés Island, *Howell* in 1876 (WS); Grants Pass, *Henderson* in 1886 (UO).

18. *Centaurea solstitialis* L. BAJA CALIFORNIA: El Rosario, acc. Hall (Univ. Calif. Publ. Bot. 3:244,—1907). CALIFORNIA: commonly naturalized in the hills and valleys, attaining elevations up to 4000 feet, records seen from 31 counties from Siskiyou County south to San Diego County. NEVADA: Washoe County. OREGON: Deschutes, Gilliam, Jackson, and Josephine counties. WASHINGTON: Klickitat, Okanogan, Shumana, Stevens, Walla Walla, and Whitman counties. Also Arizona and Idaho.

Early California records: Oakland, *A. Kellogg* in 1869 (DS); Vacaville, *Jepson* in 1887 (UC); "near San Francisco and San Diego," acc. Gray, Syn. Fl. 1, pt. 2:406 (1884).

19. *Centaurea sulphurea* Willd. *C. sicula* of California references. Persist-

ing along the Sacramento highway southwest of Folsom in the vicinity of Alder Creek, Sacramento County, California: *Kennedy in 1923* (Sac, J), *Jacobsen in 1923* (P), *Cole in 1924* (CAS), *Bellue in 1932*, in 1955 (CAS, Sac), *Stebbins in 1952* (CAS, DS).

20. *Centaurea eriophora* L. Roadside, Highland Park, Los Angeles, California, *A. Davidson in 1909* (UC). The date given by Davidson and Moxley (1923, p. 440) is 1911. Miss Bonnie Templeton writes that the collection date on the specimen in the Davidson herbarium is May, 1909.

Cirsium

1. Heads more or less unisexual, the plants tending to be dioecious. Perennial with rhizome-like roots.....1. *C. arvense*
1. Heads with perfect flowers.....2
2. Upper side of leaves scabrous or scabrous-hispid.....3
2. Upper side of leaves arachnoid or glabrescent, not scabrous. Plants perennial with rhizome-like roots.....4
3. Stems winged; involuclral bracts thickly arachnoid, linear-lanceolate, loosely ascending.....2. *C. vulgare*
3. Stems not winged; involuclral bracts thinly arachnoid or glabrescent, ovate, closely appressed.....3. *C. scabrum*
4. Heads large, mostly 4-6 cm. across; involuclral bracts ovate; anther-tips long, subulate-acuminate.....4. *C. ochrocentrum*
4. Heads generally less than 4 cm. across; involuclral bracts narrower; anther-tips shorter, rather abruptly subulate.....5. *C. undulatum*

1. *Cirsium arvense* (L.) Scop. BRITISH COLUMBIA: widespread in southern part and on Vancouver Island. CALIFORNIA: seen or reported from 28 counties from Del Norte, Siskiyou, and Modoc counties south to Orange County (according to a statewide survey conducted by Marvin Switzenberg). OREGON: Curry, Deschutes, Klamath, Lane, Malheur, Marion, Multnomah, and Union counties. WASHINGTON: Chelan, Island, Lewis, Mason, San Juan, Whatcom, and Whitman counties. Also in Alberta, Colorado, Montana, Nevada, Utah, and Wyoming.

The distributional data given above pertain to the plant that is usually regarded as typical *C. arvense*, the one in which the leaves are deeply lobed or pinnatifid. Much less common is the plant with shallowly lobed or subentire leaves known as var. *mite* Wimmer & Grabowski. British Columbia (WSC). CALIFORNIA: Monterey and Orange counties. OREGON: Multnomah County. WASHINGTON: Chelan, Whatcom, Whitman, and Yakima counties. Also in Arizona (CAS), Colorado (acc. Fernald in Gray's Manual ed. 8), and Wyoming. Cronquist (1955, p. 135) states that "the original of Linnaeus seems to have been the phase . . . which has more recently been called var. *mite*," but he gives no reason for his statement.

The earliest western collection of *C. arvense* seen is the one made in 1888 at Arcata, Humboldt County, California, *Chesnut & Drew* (UC). Sheldon made the earliest western collection of var. *mite* that I have seen: Lower Albina near Portland, Oregon, in 1903 (UO).

2. *Cirsium vulgare* (Savi) Tenore. *C. lanceolatum* of western references. This is probably the commonest and most widespread weedy thistle in

western North America. It is known to me from 24 counties in California, 9 counties in Oregon, and 13 counties in Washington. I have seen specimens or records of it also from Alberta, Arizona, British Columbia (including Vancouver Island), Colorado, Idaho, Nevada, Utah, and Wyoming. The earliest western record I have seen is that collected by T. S. Brandegee from The Dalles, Oregon, in 1882 (UC). The earliest California specimen I have seen is from Berkeley, *Bioletti in 1892* (UC). Neither this thistle nor *C. arvense* was known in California in 1876 (Gray, 1876, p. 417).

3. *Cirsium scabrum* (Poir.) Bonnet & Barratte. This tall and striking native of the Mediterranean region grew spontaneously near Glenwood, Santa Cruz county, in the Santa Cruz Mts., California, in 1900 but it never became naturalized. It was reported by Alice Eastwood (Zoe 5:59) under the synonymous name *Cnicus giganteus* (Desf.) Willd. and a specimen of it is preserved in the Brandegee Herbarium of the University of California.

4. *Cirsium ochrocentrum* Gray. A localized but persistent weed in southern California: Santa Catalina Island (CAS); Puente, Los Angeles County (CAS); San Marcos and Otay Mesa, San Diego County (SD). The plants on Otay Mesa are listed as *C. megacephalum* and *C. undulatum* by Mrs. Higgins (1949, p. 155), but the elongate subulate anther-tips would indicate *C. ochrocentrum* as the correct name.

5. *Cirsium undulatum* (Nutt.) Spreng. *vel aff.* Thistles with a medium-sized head that resemble *C. undulatum* have been collected as field weeds in Lassen and Riverside counties, California. The spines on the involucre bracts are stout and tend to be flattened, and, in the Riverside plant, the involucre bracts tend to spread loosely. Differences between specimens of the California weed and those more typical of *C. undulatum* are due possibly to the chemical weed-killers that had been applied to the plants before collections were made; or perhaps the weed is from the Old World and unrelated to the North American *C. undulatum*.

Cnicus

1. *Cnicus benedictus* L. CALIFORNIA: specimens collected in 25 different counties, from Humboldt and Shasta on the north to San Diego on the south, have been examined. OREGON: Jackson, Josephine, Lane, Linn, Marion, Union, and Wasco counties. WASHINGTON: Klickitat, Walla Walla, and Whitman counties.

Early records: reported as common near Healdsburg, Sonoma County, California (Bot. Calif. 2:459,—1880); Grants Pass, Josephine County, Oregon. *Howell 168* in 1884 (UO, UW).

Cynara

1. Leaves more or less spiny; involucre bracts tipped with a stiff spine. . . .

.....1. *C. Cardunculus*

1. Leaves not spiny, involucre bracts spineless or nearly spineless.

.....2. *C. Scolymus*

1. *Cynara Cardunculus* L. BAJA CALIFORNIA: roadside weed, Santo Tomás, *Howell 30944* in 1956. CALIFORNIA: Alameda, Amador, Contra Costa, Orange, Santa Barbara, and Solano counties.

2. *Cynara Scolymus* L. CALIFORNIA: San Diego, San Luis Obispo, San Mateo, Santa Barbara, Santa Clara, Sonoma, and Ventura counties. Reported from other coastal counties where artichokes are cultivated. Greene's records (Fl. Franciscana 475,—1897; repeated by Jepson, Fl. W. Mid. Calif. 504,—1901) are given under the name *C. Scolymus*, but probably represent not only that species but also *C. Cardunculus*.

Early California records. *Cynara Scolymus* was reported as "occasionally spontaneous" in 1876 (Bot. Calif. 1:417); the earliest collections of *C. Cardunculus* I have seen are *Jepson 1746* (J) from Cordelia, Solano County, August, 1901, and *Abrams 1767* (DS) from Irvine, Orange County, also in 1901.

Echinops

1. Upper side of leaves glandular-scabridous; middle and inner involucre bracts glandular-pubescent.....1. *E. sphaerocephalus*
1. Upper side of leaves sparsely viscidulous-hairy; the middle and inner involucre bracts scabrous-roughened, not glandular.....2
2. Middle and inner involucre bracts lavender; corollas lavender-blue....
.....2. *E. ruthenicus*
2. Middle and inner involucre bracts gray-green with a silvery sheen; corollas whitish.....3. *E. commutatus*

1. *Echinops sphaerocephalus* L. Along road, 5 to 6 miles east of Tulelake, Modoc County, California, K. G. Baggett, July 9, 1952 (UC, Davis). This is the only occurrence of this globe-thistle known to me from western North America, and I am grateful to Dr. John M. Tucker for calling it to my attention.

2. *Echinops ruthenicus* M. Bieb. Whitman County, Washington: vacant lot, Pullman, J. H. Rumely 364 in 1954 (WSC); weedy patch among beehives, Oakesdale, J. Peterson, September, 1954 (WSC).

3. *Echinops commutatus* Juratzka. Cowlitz County, Washington, I. R. Adlard, July 20, 1954 (WSC). Perhaps a fugitive from cultivation.

Onopordum

1. *Onopordum Acanthium* L. BRITISH COLUMBIA: Nanaimo, Macoun in 1914 (V), Eastwood 9929 in 1920 (CAS); Cowichan River, J. R. Anderson in 1897. CALIFORNIA: bank of Kelsey Creek, 0.5 mile north of Pine Grove, Lake County, T. C. Fuller 897-58 in 1958 (CAS, Sac); Bieber, Lassen County, T. C. Fuller 901-58 in 1958 (CAS, Sac); Adin, Modoc County, T. C. Fuller 899-58 in 1958 (CAS, Sac). IDAHO: Clark, Nez Perce, and Washington counties. OREGON: Klamath, Malheur, Union, and Walla counties. UTAH: Leeds, Washington County, Eastwood & Howell 1201 in 1933 (CAS). WASHINGTON: Asotin and Walla Walla counties. Texas.

Because of its wide and frequently abundant distribution in southeastern Washington and northeastern Oregon, one might surmise that the plant was introduced there many years ago. However, the earliest record I have seen from those parts is the collection made by Holladay in 1945 at Ontario, Malheur County (OSC). Although the plant was doubtfully reported from San Francisco by Gray in 1857 (Pac. RR. Rept. 4:112), it is now definitely in

California as indicated by the above-cited collections. (See T. C. Fuller in Calif. Dept. Agr. Bull. 47:222, 223,—1958.)

Generally the plants of *O. Acanthium* are greenish or canescent with a thin close archnoid tomentum, but specimens received in 1953 from Box Elder County, Utah, are unusually pale with a looser tomentum that is especially thick on the lower part of the stems and densely arachnoid on the involucre. Thinking that this plant might be a recognized variety of *O. Acanthium*, I looked for comparable material in 1953 in herbaria in Chicago, New York, Philadelphia, and Washington, but nothing like it was detected, either under *O. Acanthium* or related species.

Silybum

1. *Silybum Marianum* (L.) Gaertn. BRITISH COLUMBIA: Vancouver Island. CALIFORNIA: common at lower elevations west of the mountains, specimens examined from 26 counties from Humboldt County south to San Diego County. NEVADA: Auburn, Esmeralda County, *Shockley in 1886* (J). OREGON: Curry, Lane, Marion, and Multnomah counties. WASHINGTON: Clark County; Pullman, acc. St. John (Fl. SE. Wash., p. 469). Texas.

Early California records. Katharine Brandegee (*Zoe* 2:76) recalls *S. Marianum* in Sacramento County as early as 1854. In 1857, Gray reported a collection from near Knights Ferry, Stanislaus County. The oldest California collection I have seen is *Brewer 485* made in 1862 (UC).

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TWO RANGE EXTENSIONS FROM THE EASTERN MOJAVE DESERT, CALIFORNIA

BY JOHN R. HALLER

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MONARDELLA ROBISONII Epling. The only locality recorded in the literature for *Monardella Robisonii* is the Little San Bernardino Mountains, San Bernardino County, California. The type locality is Keyes Ranch, where the species was reported as growing "among boulders and between crevices" by Professor Carl Epling. In 1953, and again in 1958 (*Haller 1329*), I collected specimens of *M. Robisonii* at the southeast base of the Granite Mountains, 3 miles south of Granite Pass and about 15 air miles north of Amboy, San Bernardino County, California, at an elevation of about 4400 feet. Specimens from the 1958 collection are on file in the herbarium of the University of California at Santa Barbara. Although the Granite Mountains are about 65 miles north-northeast of Keyes Ranch, the sites occupied by *M. Robisonii* in the two localities are apparently quite similar, since the plants in the Granite Mountains were found growing on ledges between huge, partially weathered granitic boulders. In all probability *M. Robisonii* has a more widespread distribution than is yet known. Additional localities for it should be found in other isolated granitic ranges of the Mojave Desert.

GROSSULARIA QUERCETORUM (Greene) Cov. & Britt. This species was collected in 1953 and 1958 (*Haller 1335*) at a locality known to local residents as "Hole-in-the-Wall" near the Providence Mountains on the road between Essex and Cima, 10 miles by road north of the Mitchell's Caverns Road junction and 26 miles north of Essex, San Bernardino County, California, at an elevation of 4400 ft. The specimens are on file in the herbarium of the University of California at Santa Barbara. Only two bushes were found at this locality. Both were growing near the bottom of a narrow ravine in the shade of overhanging cliffs. The precipitousness of the terrain, however, made a thorough exploration impossible. *Grossularia quercetorum* occurs abundantly in Kern County in the foothills of the southern Sierra Nevada where it is associated with *Quercus Douglasii* H. & A., and less frequently in the mountains bordering the western margins of the Mojave and Colorado deserts. Hole-in-the-Wall

is approximately 150 miles northeast of the nearest of these localities, and is almost certainly the eastern limit of *G. quercetorum* in California. About 250 miles further east, however, the species reappears in the mountains of south-central Arizona. In addition to *G. quercetorum*, several other species that are mainly distributed in cismontane California and that reappear in central Arizona are found in the vicinity of the Providence Mountains. These include *Rhamnus californica* Esch. and *R. ilicifolia* Kell.

IRIS PSEUDACORUS AND CALTHA PALUSTRIS IN CALIFORNIA

BY PETER RUBTZOFF

Iris Pseudacorus L. and *Caltha palustris* L., which in California are sometimes cultivated for ornament in shallow water along the edges of ponds, have been found to grow without cultivation in a marsh one-fourth mile east of Forestville in Sonoma County, California. There they form, in open marshy ground and shallow water, a large mixed colony stretching along the sides of a dirt road which crosses this marsh, and are associated with such native plants as *Typha latifolia* L., *Sagittaria latifolia* Willd., *Carex Cusickii* Mke., *Carex stipata* Muhl., and others. The fact that the colony is situated along a road may mean that the plants were originally planted there, although the people now living near the marsh do not remember the cultivation of the plants in the area. Whether originally planted or not, at the present time the plants grow spontaneously, are well established, and are spreading. The following specimens have been collected (herb. Calif. Acad. Sci.):

IRIS PSEUDACORUS: Rubtzoff 1258 (June 15, 1952, fr.), 1549 (July 17, 1954, fr.), 1813 (April 30, 1955, fl.), 1836 (May 14, 1955, fl.), 1946 (July 9, 1955, fr.).

CALTHA PALUSTRIS: Rubtzoff 1768 (April 9, 1955, fl.), 1871 (May 21, 1955, fl., fr.).

Caltha palustris is native in northern and eastern North America and arctic and temperate Eurasia. This is apparently the first record of its spontaneous occurrence in California.

Iris Pseudacorus is native in Europe and the Mediterranean region and is naturalized in the eastern United States. In addi-

tion to the occurrence of the species in Sonoma County as noted above and in Merced County as recently noted by H. L. Mason (Fl. Marshes Calif., p. 387, —1957), there are several other California collections that should be listed. Henry M. Pollard collected it on April 18, 1948, at Lyons Springs, Matilija Canyon, Ventura County, and J. T. Howell (28360) collected it in a swamp 2 miles west of Montague, Siskiyou County on June 15, 1952. More recently, on May 11, 1958, it was collected along the edge of Searsville Lake, San Mateo County, by John H. Thomas (7165) who notes that it was “introduced and [is] perhaps spreading slowly.” These three collections, as represented in the California Academy of Sciences Herbarium, are in flower.

TRIBULUS TERRESTRIS IN THE SANTA CRUZ MOUNTAINS. In 1954, I examined the herbaria in the San Francisco Bay region for specimens of *Tribulus terrestris* L. from the Santa Cruz Mountains of central California but none was to be found. In July, 1954, I found the species on the gravelly bottom of Carnadero Creek near Gilroy (Thomas 4354). Since then it has been found in San Francisco (Howell, Raven, and Rubtzoff, A Flora of San Francisco, California, 1958, p. 98) and during the summer of 1958 I found it on the Stanford University Campus (Thomas 7364) and along the railroad tracks in Palo Alto (Thomas 7464). *Tribulus terrestris* is too noxious a weed to be undetected for long.—JOHN H. THOMAS, Dudley Herbarium, Stanford University.

EPILOBIUM HALLEANUM IN SANTA CRUZ COUNTY, CALIFORNIA. *Epilobium Halleanum* Hausskn. has hitherto not been known south of Marin County in the California Coast Ranges (Howell, Marin Flora, p. 198, —1949). On April 23, 1950, I collected specimens of this species at Camp Evers in central Santa Cruz County, about 2.5 miles east of Felton (approximately at Lat. N. 37° 02.5', Long. W. 122° 01.7'). It grew in boggy ground near willows. Several plants bore turions. Specimens of my collection, No. 1672, are deposited in the Dudley Herbarium of Stanford University, the herbaria of the California Academy of Sciences and the Rancho Santa Ana Botanic Garden, and in my own herbarium.—JOHN H. THOMAS, Stanford University.

LEAFLETS *of* WESTERN BOTANY

Commemorating the Centennial of the Death of
THOMAS NUTTALL

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THOMAS NUTTALL (1786-1859): AN EVALUATION AND BIBLIOGRAPHY

BY C. EARLE SMITH, JR., AND JOHN W. THIERET*

Chicago Natural History Museum, Chicago

While there have been several attempts to piece together a biography of Thomas Nuttall (1786-1859), no overall effort has been made to place the man in the setting of his time in order to evaluate his work and the influence which he may have had on the progress of botany in the United States. On the occasion of the centennial of Nuttall's death, it seems fitting that such an evaluation be attempted even though the biographical background remains obscure. Furthermore, no complete bibliography of Nuttall's publications has been assembled heretofore.

Biographical information is inadequate because of several circumstances. Nuttall was a seriously introverted person who had few firm friends but many acquaintances. Thus, he left no clear trail of personal letters and notes. The obituary accounts, furnished primarily by acquaintances rather than close friends, apparently were based on memories rather than memoranda. Pennell¹ reconstructed much of his excellent sketch from Nuttall's scientific works and specimens, a truly barren source of personal notes.

It appears to be clearly established that Nuttall did not have the benefit of a full education but was early apprenticed to learn the printing trade. His subsequent acquisition of certain rudiments of learning was, then, entirely his own undertaking. It was probably accomplished after a dawn-to-dark workday. That he had the spirit to improve his background is indeed remarkable. Because of his personal reticence, we have no direct knowledge that he became acquainted with the existent publications on natural history during the period when he was thus studying. He did acquire a background in Latin and Greek as well as an acquaintance with Persian. Because of ill health in 1804, his apprenticeship was interrupted by a trip to his home area in

* The introductory text was prepared by C. E. Smith, Jr., as an adjunct to the bibliography assembled by J. W. Thieret.

¹ Pennell, F. W. (1936). Travels and scientific collections of Thomas Nuttall. *Bartonia* 18:1-51.

Yorkshire where he was introduced to field collecting through friendship with John Windsor.

With this background, Thomas Nuttall came to the United States in 1808. While there is probably some truth in the stories that Nuttall became immediately absorbed in the local flora, he apparently arrived with only a small amount of money and no letters of introduction. His first concern would have had to be a source of income. We can assume that he took a job with a Philadelphia printer and confined his interest in natural history to such time as he was not occupied at his trade. From his former studious habits, though, we may further assume that he continued his self-improvement. During this early period, Nuttall undoubtedly did some botanical collecting and is said to have attended Benjamin Smith Barton's lectures in the subject. This probably was not a college lecture course, but a series of public lectures.

Fortunately for Nuttall, several events had taken place which must have had an influence on his association with Barton. The several American botanists with sufficient background to evaluate it had agreed that Michaux's *Flora Boreali-Americana* etc.² was incomplete; Henry Muhlenberg of Lancaster, Pennsylvania,³ and Barton had both decided to produce more ample floras of their own. About the time of Nuttall's arrival in the United States, Henry Muhlenberg had manuscript in nearly finished form, a fact which would have been known to Barton and which probably emphasized the lack of preparation of his own flora. Also, Barton's young German assistant, Frederick Pursh, had left his employ in 1807 to take charge of David Hosack's garden in New York. Nuttall was then taken on as Barton's protégé. This must have been a much less restraining partnership, though, than the arrangements with Pursh, because few of the Nuttall specimens remain today in Barton's herbarium, while much of Pursh's collection is there.⁴ The

² Michaux, A. (1803). *Flora boreali-americana*, etc. Paris.

³ Muhlenberg, G. H. E. (1813). *A catalogus of the hitherto known native and naturalized plants of North America*. Lancaster.

Also: Merrill, E. D., and Shiu-Ying Hu (1949). *Work and publications of Henry Muhlenberg with special references to unrecorded or incorrectly recorded binomials*. *Bartonia* 25:1-66.

⁴ In the United States, the largest set of Nuttall specimens is at the Academy of Natural Sciences of Philadelphia where the Delaware plants of the first trip are in the Benjamin Smith Barton herbarium, and the remainder in the general herbarium. A few Nuttall specimens are among the A. B. Lambert plants which came to the Academy in 1855. Many specimens from Nuttall may be found in the Gray Herbarium, some are in the Torrey herbarium of the New York Botanical Garden, and a few may be found in the herbarium of the Missouri Botanical Garden. In Europe, the British Museum acquired the private herbarium of Nuttall, but we understand that the Nuttall plants in the Liverpool Museum may, in some instances, be larger specimens. There are some Nuttall specimens in the Kew herbarium.

major value of this to Nuttall was an assurance of income during the periods when he was in Philadelphia. From Barton's standpoint, the support of Nuttall placed a botanical collector at his command to provide specimens toward the projected flora. That he was jealous of other efforts along the same line is amply shown by the agreements which he made with Nuttall prior to the 1810 excursion in the Northwestern Territory, stating, "... all the observations you may make, are to be my exclusive property; and no parts of them are to be communicated, without my consent, to any person." (Pennell, l.c., p. 46.)

Pennell has remarked (l.c., p. 2), "We do not know how successful Nuttall was as a man of business, or how he gained freedom from it for such extensive periods." While it is purely conjecture, it is probably safe to assume that Nuttall was a most astute businessman: Barton passed away in December of 1815, but Nuttall continued his long collecting trips without any visible patronage. In all probability, Nuttall had become a regular supplier of roots, seeds, and bulbs for European nurseries which often commissioned orders in advance so that the collector was, in substance, subsidized by his commercial contacts. Nuttall had certainly established an early reputation for finding new material as he had taken much viable stock to England in 1812 from his Missouri trip. Fraser's Nursery published a catalogue of these plants in 1813 which was written by Nuttall.

Nuttall's first major effort in the role of author was his "Genera of North American Plants, and a catalogue of the species, to the Year 1817." This is the type of publication which Muhlenberg may have had in mind as supplementary to the Michaux Flora. As Pursh's Flora⁵ had appeared previously, Nuttall offered his Genera as a supplement to this. This and his later publications in all disciplines mark Nuttall as a pre-eminent field man. The observations recorded for each species show an astute understanding of the details needed for the characterization of the unit. Nuttall added valuable habitat notes to many of the species which he discussed.

This first work of Nuttall includes the descriptions for 47 new genera and many new species. These are often the result of his own wide field experience although he obviously had much material from contemporary collectors. The tags which

⁵ Pursh, F. T. (1816). *Flora americanae septentrionalis*, etc. ed. 2. London.

he used for the specimens in the herbarium sometimes indicate the collector of the specimen; at other times, there is no more than the name of the plant and a bare locality recorded. Nuttall obviously made wide use of whatever came to hand.

In this and in all of the subsequent botanical publications of Nuttall in which he arranges descriptions in order, he uses the Linnean system of classification. In the prefaces to several works he mentions his acquaintance with the publications of Jussieu and others who proposed a natural system. For his own purposes, the purely artificial Linnean system was apparently the easier to use. At no time does Nuttall attempt to enlarge upon the relationships of plant groups, although his wide field knowledge particularly fitted him for such an endeavour.

Thomas Nuttall came into North American botany at an opportune time for the type of descriptive work for which he is known. The basic nomenclature of the North American flora had been roughed out by Michaux and Pursh in their respective floras, and it had been added to by the Muhlenberg "Catalogus." The American Philosophical Society had established a "natural history cabinet" for the deposit of specimens. Shortly after the arrival of Nuttall, the Academy of Natural Sciences of Philadelphia was founded for the express purpose of bringing together collections and men interested in natural history. Nuttall was admitted to membership in both the Philosophical Society and the Academy of Natural Sciences in 1817. With the deaths of Muhlenberg and Barton (both in 1815), their herbaria became a part of the collections of the Philosophical Society, and thus available to Nuttall.

From the time of the publication of the *Genera* until 1825, Nuttall remained active in field work and in the identification of his plants at the herbarium of the Academy of Natural Sciences. Then, for the period from 1825 to 1834, he was Lecturer on Natural History and Curator of the Botanic Garden at Harvard College, where his work in plant taxonomy was apparently hampered by lack of library facilities and herbarium specimens. It was during this period of teaching and other duties that Nuttall wrote the "Introduction to Systematic and Physiological Botany" and the "Manual of Ornithology." While the former does not seem to have been more than moderately successful, the latter became an early best-seller. The many plant descriptions which Nuttall presented have endured be-

cause of nomenclatural priority, but, by popular demand, the *Manual of Ornithology* went through several revised editions. This was Nuttall's most lasting publication.

After his resignation was accepted by Harvard College in 1834, he again went to the Academy of Natural Sciences of Philadelphia where he took up the systematic work that he had not completed while in Boston. The finishing touches were put to three papers, two of which probably were in progress over a period of years. One paper was on the Wyeth western plants which came to Nuttall late in 1833. The other two concerned new plants in the Academy's herbarium and the plants collected on Nuttall's Arkansas trip. This year he began his extended trip to the Pacific Northwest and the Hawaiian Islands which was to occupy him until 1836.

From his return to the Philadelphia scene in 1836 until his final departure for England in 1842, Nuttall worked steadily on descriptive papers. He contributed many descriptions for the first volume of Torrey and Gray, "*Flora of North America*"⁶ but declined to contribute to the succeeding volume. Most of the descriptive papers of this period concern the plants collected during the long expedition just completed. By now, Nuttall has become a master of his craft. The descriptions are smooth and the commentary on the plants is flowing and more easily readable than the tense, nervous style of the "*Genera*" of 1818. With all of his vast knowledge of the North American flora, Nuttall did not attempt any systematic arrangements of the descriptions.

The most sumptuous work which Nuttall prepared was the supplement to the *North American Sylva* in three volumes complete with fine colored plates. F. A. Michaux⁷ had produced the first three volumes with illustrations by such famed artists as Redouté and Bessa. The illustrations of the Nuttall supplement do not compare favorably with the European plates. In the text, though, Nuttall becomes discursive. He paints word pictures of the trees in their habitats and describes the odors of their flowers and the flavors of their fruits, with occasional comments on individual trees which he has seen. Once in a while, it is obvious that Nuttall has labored over his manuscript. Here the style becomes more stilted with the wordiness

6 Torrey, J., and A. Gray (1838-1840). *A flora of North America*; etc. New York.

7 Michaux, F. A. (1810-1813). *North American sylva*, etc. Paris.

common to the period. For the person interested in trees in North America, the *Sylva* still provides fascinating reading even though the nomenclature is now out of date.

After he took over his uncle's estate in England in 1842, practically all of Nuttall's descriptive work came to an end. On his one return visit to Philadelphia in 1847-48 he worked up the descriptions for the Gambel collections, but this paper somehow lacks the polish which his earlier papers display. He published one new genus in 1844 and apparently did nothing further in England until 1853 when he described Asiatic rhododendrons in two articles. He had been growing rhododendrons in his gardens at Nutgrove Hall.

Thus, from an apprenticeship in a print shop in Liverpool, Nuttall became one of the foremost descriptive botanists of North America during the days when Philadelphia was the scientific and cultural center of the United States. The chief value in his work lies in the accuracy of the field observations which he incorporated into descriptions and observations. He was a man with an avid interest in plants, who was fortunate in coming into North American botany after the preliminary outline of the flora had been drawn. There was still sufficient European interest in North American plants to make field collecting a profitable business while Nuttall was assembling the herbarium which he used so extensively during his periods in Philadelphia. He collected much in other fields, and he published in geology and ornithology, but Nuttall's greatest fame will always come from his botanical work.

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Vol. 1, published by J. Dobson, appeared in two parts: part 1 (pp. 1-56) was published about the middle of 1842 (see Amer. Journ. Sci., and Arts 44: 194-195. Oct.-Dec. 1842); several sources (*e.g.* Cat. Libr. Arn. Arb., Harv. Univ. 1:525. 1914; and Schneider in Bot. Gaz. 67:316. 1919) give 1843 as the date of publication of the remainder of the volume. We have seen no conclusive evidence to support this assertion.

Vol. 2, published by T. Ward, appeared in 1846.

Vol. 3, published by Smith and Wistar, appeared in 1849.

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NEW CASTILLEJAE AND A
NEW CORDYLANTHUS FROM NEVADA

BY GABRIEL EDWIN

Washington, D. C.

In reviewing material of the *Scrophulariaceae*, collected in Nevada, the taxa described below were considered new and are now presented.

Castilleja Trainii Edwin, spec. nov. Corolla genitaliaque in calyce inclusa; calyx 15–20 mm. longus antice infra medium postice per 3–4 mm. fissus, lobis lateralibus perbrevibus 1–2.5 mm. longis dentibus acuminatis acutisve; corolla 9–16 mm. longa omnino glabra, galea 6–9 mm. longa tubum valde superante; filamenta brevia corollae tubum vix superantia; stylus brevis corollam plerumque superans.

Corolla and genitalia completely included in the overtopping calyx (occasionally the stigma exerted); stems up to 7 dm., single, branched near the top, glabrous over most of the length, pubescent with short, white, glandless hairs below the inflorescence, and with mixed glandular and glandless, short, white hairs at the inflorescence; leaves glabrous, linear to linear-lanceolate, mostly entire, the lowest about 5 cm. long, much reduced above, the upper occasionally with one lobe; bracts 3-lobed from below the middle, center lobe lanceolate-attenuate, outer pair linear-lanceolate, each with one nerve, puberulent with short white hairs on the nerves and margins; calyx 15–20 mm. long, sparsely pubescent with short, white hairs, cleft very unevenly medianly to below the middle adaxially (above) and only 3–4 mm. abaxially (below), the lateral cleavages very short, 1–2.5 mm., the teeth acute to acuminate; corolla 9–16 mm. long, glabrous throughout; galea 6–9 mm. long, always much longer than the tube; lip 1–2 mm. long, somewhat inflated and little callosed, the 3 teeth acute; filaments short, little exceeding the corolla-tube; style glabrous often exceeding the corolla; stigma longer than broad, bilabiate.

Type: *Percy Train*, no number, (US), July 20, 1936, Elko County, Nevada, Ruby Mountains, Lamoille Canyon. (Nat. Arb. Herb. Cat. No. 82659.)

A very unusual *Castilleja* in the typical subgenus. The unequally cleft calyx indicates the section *Castilleja*. However, the included corolla and genitalia, galea exceeding the corolla-tube, and the smallness in length of the corolla make it necessary to propose a new subsection *Trainianae*, in which this taxon is placed. The taxa in the subsection *Linariaefolia*, which is nearest to *Trainianae*, have exerted corollas, tubes longer than galeas, and corollas (25–) 30–45 mm. long. The only near relative to this taxon in the United States is *C. linariaefolia* Benth., but the relationship is not close enough to place *C. Trainii* in the same subsection.

Castilleja Helleri Edwin, spec. nov. Perennis, bracteae scutiformes; calyx ca. 18 mm. longus subaequaliter fissus lobis lateralibus 4–6 mm. longis, marginibus ciliolatis; corolla 20–25(28) mm. longa, tubo galeam gracilem 7–9 mm. longam dorsaliter puberulam superante; labium ca. 2 mm. longum callosum vix saccatum; stamina subaequalia glabra; stigma paulo bilobatum latius quam longius; capsula ca. 15 mm. longa compressa, seminibus multis ca. 2 mm. longis, testa laxa reticulata.

Perennial, stem branched from the base, about 5 dm. high, puberulent with white hairs; leaves lanceolate, lanceolate-ovate to narrowly ovate, margins ciliolate, entire, herbage glabrous or finely puberulent; bracts red-tipped, 3-lobed from above the middle, the lateral pair lanceolate, the middle lobe ovate, the entire bract shield-shaped; calyx about 18 mm. long, subequally cleft dorsally and ventrally about $\frac{1}{3}$ the length of the calyx; the lateral cleavages 4–6 mm. long, lanceolate to lanceolate-ovate, attenuate, tissue puberulent, margins ciliolate; corolla 20–25(28) mm. long, tube longer than the slender, 7–9 mm. long, galea which is dorsally puberulent with short hairs, the lip about 2 mm. long, callosed, little if at all saccate; 2 pairs of stamens subequal, glabrous; style glabrous; stigma slightly bilobate, little wider than long; capsule about 15 mm. long, flattened; seeds numerous, about 2 mm. long, the loose testa reticulate.

Type: *A. A. Heller No. 10348* (Nev. Agric. Exp. Sta. Herb. No. 12037), August 26, 1911, Mt. Rose, 9300 ft., Washoe County, Nevada.

This taxon is provisionally placed in the *Chromosae*, the species of which it superficially resembles but from which it is apparently distinct.

Castilleja pyramidalis Edwin, spec. nov. Perennis; bracteae rubrae basi virides quinquefissae marginibus ciliatis ca. 17 mm. longae, jugis loborum duobus (jugo inferiore lanceolato, jugo superiore brevi, anguste lanceolato-ovato, lobo medio ovato); calyx postice soliter ca. $\frac{3}{4}$ longitudinis antice co. $\frac{1}{3}$ fissus lobis lateralibus prebrevibus, ca. 1–1.5 mm. longis; corolla ca. 19 mm. longa; galea tubo paulo longior (ca. 10 mm.); labium ca. 3 mm. longus callosum, saccatum; filamenta subaequalia, glabra, antheris glabris exsertis; stigma bilobum latius quam longius; stylus glaber; capsula inflata apiculata ca. 15 mm. longa.

Perennial, stems branched from the base, about 4 dm. high, entire plant beset with soft white hairs; lower leaves mostly entire becoming variously incised above, with 2–5 lobes, linear-lanceolate to lanceolate, margins entire and ciliolate; bracts red, base green, with 2 (occasionally 3) pairs of lobes (5- rarely 7-cleft), a pair from near the base, lanceolate, a pair from near the apex short, narrowly lanceolate-ovate, all margins ciliate, about 17 mm. long; calyx cleft about $\frac{3}{4}$ dorsally, about $\frac{1}{3}$ ventrally, the lateral cleavages very short, about 1–1.5 mm.; corolla about 19 mm. long; galea little longer than tube (about 10 mm.), lip about 3 mm. long, callosed, saccate; the 2 pairs of filaments almost equal in length, glabrous, anthers glabrous, exserted; stigma bilobate, wider than long; style glabrous; capsule inflated, about 15 mm. long, apiculate-tipped.

Type: *P. A. Lehenbauer* No. 2832 (Univ. Nev. Herb. No. 16015), May 28, 1933, near Desert Run, Pyramid Lake, Washoe County, Nevada.

This is closest to *C. hispida* Benth. in the *Chromosae* from which it differs in its smaller flowers, larger lip in relation to the galea, and small lateral calyx-teeth.

Castilleja flavescens Pennell. Caulis basi fruticosus ca. 7 dm. altus; folia usque ad 8 cm. longa plus minusve amplexicaulia; bracteae quinquelobatae lobi apice rubri basi virides; calyx 17–19 mm. longus in lobos brevis mediano et in lobos triangularis lateralis ca. 2 mm. longos fissus; corolla 20–22 mm. longa glabra, galea 10–11 mm. longa, labio inferiore ad rudimentum redacto.

Stem woody at the base, about 7 dm. tall, with scattered, short, white hairs below, densely beset with long, soft, white hairs above and in the inflorescence; leaves up to about 8 cm. long, lanceolate, pubescent with short hairs, somewhat clasping at the base, entire, sinuate, upper smaller sometimes with a pair of short, acute lobes; flowers in a dense spike, sessile; bracts about 2 cm. long, with 5 red-tipped, green-based lobes, the two lateral long and awl-shaped, inner two short, center one broadest, all short-acute-tipped, margins pubescent and ciliate, tissue glabrous, usually over-topped by the calyx and corolla; calyx 17–19 mm. long, margins pubescent, short-cleft medianly (little more ventrally than dorsally) and very little cleft laterally into short-triangular lobes, about 2 mm. long; corolla 20–22 mm. long, glabrous, galea 10–11 mm., lower lip rudimentary, tube about equal to galea in length; genitalia exerted; the two pairs of stamens glabrous, subequal; the stigma and style glabrous, stigma flattened; capsule 11 mm. long, ovoid; seeds 1–1.5 mm. long, about 0.5 mm. wide, triangular to subovate, surrounded by a reticulate, hyaline, prismatic, wing-like appendage.

Type: Philadelphia Academy 90305, collected by F. W. Pennell and R. L. Schaeffer, Jr., No. 22872, July 12–14, 1938, White Pine County, Nevada, Duck Creek, northeast of McGill in sandy loam, among sagebrush, 7200–8000 ft.; isotype, CAS.

Close to *C. angustifolia* (Nutt.) Don from which it differs in its much taller stems, longer leaves, shorter corolla-lip, and calyx smaller than the corolla.

Castilleja calcicola Pennell. Caespitosa usque ad 1.5–2 dm. alta basi fruticosa; folia lineari-lanceolata ad 25 mm. longa, pubescentia integra vel lobis duobus linearibus praedita; flores in spica capituliformi densissima pubescenti congesti; bracteae pubescentes marginibus ciliatis loborum lanceolato-attenuatorum jugis duobus; calyx 22–26 mm. longus mediano $\frac{1}{2}$ antice $\frac{3}{4}$ postice bifidus; corolla 30–32 mm. longa, galea 16–19 mm. longa.

Small, stems clustered, woody at base, up to 1.5–2 dm., pubescent with short, white hairs; leaves pubescent with short, white hairs, linear to linear-lanceolate, short, up to 25 mm., mostly much less, entire or the broader

one with a pair of linear lobes, sometimes leaves fasciculate; inflorescence a very dense head-like spike, pubescent; bracts pubescent and ciliate-margined, with 2 pairs of lanceolate-attenuate, pointed lobes, one pair from the base and the other from near the apex, all the sinuses large; calyx deeply cleft medianly about halfway above and more than halfway (about $\frac{3}{4}$) below, laterally shallowly cleft into short lobes about 2–3 mm. long, entirely beset with cilia on the margins, somewhat puberulent on the tissue below, 22–26 mm. long; corolla 30–32 mm., galea 16–19 mm. long, exceeding the tube, dorsally puberulent, lip 2–3 mm. long, very saccate, inflated, callosed, the 3 teeth incurved; genitalia exerted; capsule 9–10 mm. long, ovoid, seeds 1–1.5 mm. long, surrounded by a hyaline, reticulate appendage.

Type: Philadelphia Academy 90306, collected by F. W. Pennell and R. L. Schaeffer, Jr., No. 22913, July 12–14, 1938, White Pine County, Nevada, Berry Creek, Shell Creek Mts., northeast of McGill, in crevices of limestone opposite forest camp, 8100–8500 ft.; isotype, CAS.

Apparently not closely related to any western United States species. Its dense inflorescence precludes placement in the *Linariaefolia*. The unequal median splitting of the calyx prevents putting it in the *Chromosae*. Superficially the taxon resembles *C. rupicola* Piper.

Castilleja latifoliata Pennell. Folia pubescentia; calyx 16–18 mm. longus pubescens, mediano $\frac{1}{2}$ postice minus antice lateraliterque lobis lanceolatis 4–6 mm. longis fissus; corolla 19–23 mm. longa, galea dorsaliter pubescente 8–11 mm. longa, tubo brevior marginibus incrassatis, labio inferiore extus puberulo 2–3 mm. longo dentibus lateralibus medianum superantibus; antherae majores 4 mm. longae; capsula lanceolato-ovoidea 17 mm. longa.

Stem woody at base up to 4 dm., covered with short, white hairs; herbage pubescent with short, white hairs, leaves 3-lobed near the apex, linear-lanceolate; inflorescence with longer hairs, a few gland-tipped; bracts 3-lobed from below the middle, lateral lanceolate, middle one broader, all ciliate on margins and veins from less than to exceeding the sessile flowers; calyx 16–18 mm. long, pubescent, cleft about halfway medianly below, less above and laterally into lanceolate lobes 4–6 mm. long, with short acute tips; corolla 19–23 mm. long; galea dorsally pubescent, 8–11 mm. long, shorter than the tube, with thickened margins; lower lip externally puberulent 2–3 mm. long, lateral teeth exceeding middle one; anthers, filaments, style and stigma glabrous, the larger anthers 4 mm. long; capsule lanceolate-ovoid 17 mm. long; seeds numerous, pointed at one end, ovate, 1–2 mm. long, covered with a hyaline, reticulate testa.

Type: *F. W. Pennell* No. 26267 (Phila. 90214), July 24, 1940, Washoe County, Nevada, south of Mt. Rose, highway route 27, on a granitic ridge, 9000–9300 ft.; isotypes, CAS.

Seemingly its closest native relative is *C. flava* from which it

can be distinguished by the external pubescence of the corolla and larger anthers and capsule.

Castilleja elkoensis Edwin, spec. nov. Perennis, ramis glabris purpureo-tinctis; inflorescentia terminalis usque ad 15 cm. longa, densa, spiciformis; calyx 19–21 mm. longus in lobos subaequalis ca. 10 mm. longos mediano et solum 1–2 mm. lateraliter fissus, marginibus molli-ciliatis; corolla 20–25 mm. longa, galea dorsaliter puberula tubo paulo brevior, 9–11 mm. longa, labio ca. 3 mm. longo bracteolam aliquantulum simulante, dentibus paulo callosis; stigma leviter dilatatum, bilobatum, ovoideum.

Erect perennial, branching from the base, up to 4 dm., branches glabrous, purple-tinged, terminated by a relatively long (up to 15 cm.) tight, spike-like inflorescence; herbage glabrous, leaves lanceolate-linear to lanceolate, up to 9 cm. long, upper with a pair of thin lobes, others entire, somewhat clasping at the base; bracts with a pair of lobes, soft-ciliate on the margins and sometimes on the tissue below with short, white hairs, the lanceolate lobes yellowish (at least when dried), base green, center lobe little broader and usually with a rounded apex; calyx 19–21 mm. long, cleft subequally about halfway medianly and only 1 or 2 mm. laterally, soft-ciliate on the margins; corolla 22–25 mm. long, externally puberulent dorsally on the galea and upper part of the tube, galea a little shorter than the tube, 9–11 mm. long, lip about 3 mm. long, somewhat simulating a miniature bract, the teeth little or not callosed; stamens and style glabrous; stigma slightly enlarged, bilobate, ovoid; capsule 13–15 mm. long, lanceolate-ovoid, seeds numerous, apiculate at one or both ends, 1.5–2 mm. long, with a reticulate, hyaline, somewhat clasping testa.

Type: *Maguire & Holmgren No. 22333*, August 7, 1943, Elko County, Nevada, frequent on dry gravelly sagebrush ridge, $\frac{1}{4}$ mile west of pass between Coon Creek and Copper Basin, Copper Mts. (Intermountain Herb. 93290).

A very perplexing taxon, difficult to place effectively, having characteristics of the *Fraternae*, *Miniatae*, and *Chromosae* but differing from each in one or more ways. Its somewhat unusual lower lip and inflated stigma are striking.

Castilleja magnistylis Edwin, spec. nov. Perennis, ramis foliisque pilis albis interdum glanduliferis dense praeditis; calyx angustus viridis usque ad 17 mm. longus mediano subaequaliter ca. $\frac{1}{2}$ ad $\frac{3}{8}$ lateraliterque in lobos lanceolato-attenuatos 4–5 mm. longos fissus; corolla 21–23 mm. longa, lutea vel viridiflava, galea 8–10 mm. longa dorsaliter puberula, labio ca. 2 mm. longo saccato; stamina glabra; stylus glaber; stigma valde dilatatum.

Small, branched perennial, up to 1.5 dm., stems and foliage densely beset with short to long white hairs, occasionally some gland-tipped; leaves short, mostly entire, lanceolate to lanceolate-ovate; inflorescence spike-like, short, usually terminating the branches; bracts green with a pair of lanceolate, lateral lobes from smaller than to exceeding the broad middle one; calyx narrow, up to 17 mm. long, green, subequally cleft medianly about $\frac{1}{2}$ to $\frac{3}{8}$ its length, cleft laterally into lanceolate-attenuate 4–5 mm.

long lobes; corolla 21–23 mm. long, yellow to greenish-yellow, dorsally very short puberulent on the 8–10 mm. long galea, lip about 2 mm. long, saccate; stamens glabrous; stigma much enlarged subhemispherical, brown when dry, style glabrous.

Type: *A. H. Holmgren* 7065, August 1, 1947, Elko County, Nevada, infrequent in rocky places at head of Thomas Canyon, Ruby Range, 9500 ft. (Intermountain Herb. 93293).

Nearest to the *Fraternae* from which it differs in color of bract and calyx, in flower-size, and in the stigma. Nevertheless the taxon is provisionally placed therein.

Cordylanthus nevadensis Edwin, spec. nov. Perennnis, usque ad 4 dm. alta ubique pilis albis apicem caulis versus densioribus longioribusque praedita; spicae 1–3-florae floribus sessilibus; bracteae trilobatae lobis lateralibus brevibus lineari-lanceolatis lobo medio lanceolato; calyx purpurascens indivisus quam corolla brevior vel longior; corolla 15–18(20) mm. longa tubo flavo labris purpurascens subaequalibus inferiore extra pubescenti saccato tubo labris longiore; stamina 2 uniloculata, glabra.

Perennial, green with purple tinge; stem branched above the base up to about 4 dm. entirely beset with white hairs that increase in length and density toward upper part; spikes of 1–3 sessile flowers; leaves mostly entire, green, lanceolate 1- or occasionally 3-nerved, sometimes with fascicles of smaller leaves in the axils, margins slightly thickened, often purplish; bracts (except those immediately below the flowers which are entire) 3-lobed from below middle, lateral lobes short, linear-lanceolate, middle one long-lanceolate; calyx purple-tinged, entire, on one side, from shorter to longer than the corolla; corolla 15–18(20) mm. long, tube yellow, lip purple or with purplish markings and stripes, lips equal or almost so, when subequal either may exceed the other, lower externally pubescent (otherwise both glabrous), saccate, tube longer than lips; stamens 2, one-celled, glabrous; stigma and style included, glabrous; capsule about 8 mm. long, seeds 2–3 mm. long, smooth.

Type: *P. B. Kennedy* No. 4282 (Nev. Agric. Exp. Sta. Herb. No. 14338), August 9, 1913, Elko County, between Gold Creek and Ranger Station, Humboldt Reserve, Nevada; isotype, CAS.

This taxon is placed in the subgenus *Eucordylanthus*, in which it obviously belongs. It is closely related to *C. capitatus* Nutt. and therefore is in the section *Capitati*. The most apparent differences between *C. capitatus* and *C. nevadensis* are the larger flowers especially the calyx of the latter which occasionally may over-top the corolla, its larger capsule, and its longer calyx-lobes. Finally the throat of the corolla in this taxon is not or only very little inflated.

Herbarium, U. S. National Arboretum
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Washington 25, D. C.

ON ASTRAGALUS DASYGLOTTIS, A SPECIES
COMMON TO ASIA AND AMERICA

BY R. C. BARNEBY

Wappingers Falls, New York

The milk-vetch which passed among the first American botanists as *Astragalus Hypoglottis* L. and among their successors either as *A. goniatus* Nutt. or *A. agrestis* Dougl. is apparently conspecific with *A. dasyglottis* Fisch. I have not seen the typus of *A. dasyglottis*, a plant from Altaic Siberia sent to DeCandolle under that name by Fischer (the collector is not recorded). However the New York Botanical Garden possesses specimens from Altai collected by Bunge, probably in 1832, and distributed by Fischer as *A. dasyglottis*; and a duplicate of *Karelin & Kirilov No. 191* (their *No. 234* as listed in *Bull. Soc. Nat. Mosc.* 1841, p. 404), a collection cited as *A. dasyglottis* by Ledebour (*Fl. Ross.* 1:603,—1842) and by Bunge (*Astrag. Geront.* 2:84,—1869). These may fairly be considered authentic for the species. The flowers of the Siberian material are on the small side of average American *A. agrestis* (the banner about 16–17 mm. long), but fall well within the known range of variation. In growth-habit, pubescence, and form of the flowers and fruits the plants match with such fidelity some forms from arid Intermountain U.S. that without labels betraying their exotic origin it would be impossible to sort them out from among the American material. The familiar name, *A. agrestis*, must give place to the older *A. dasyglottis* Fisch.

The identity of at least some American *Hypoglottoides* with Fischer's species was recognized by Nuttall, who distributed as *A. dasyglottis* plants collected on the Platte River (NY). These formed the basis of Torrey and Gray's *A. Hypoglottis* var. *polyspermus*, so named because DeCandolle had wrongly described the fruits of *A. Hypoglottis* and *A. dasyglottis* as two-seeded. Gray in his revision (*Proc. Amer. Acad.* 6:197,—1864) listed *A. dasyglottis* as a synonym of an inclusive circumboreal *A. Hypoglottis*. Subsequently the American plant has been compared repeatedly but exclusively with European *A. Hypoglottis* (auct., non L.), and the existence of a nearer relative in eastern Asia has dropped out of sight. An important exception must be made for Gontscharov's record (in *Fl. U. R. S. S.* 12:24,—1946) of *A.*

dasyglottis extending eastward into America, although none of the implicitly relevant American synonymy was cited.

Apart from nomenclature, there is a real question as to the taxonomic status of *A. dasyglottis*. It is very closely related to *A. danicus* Retz. (*A. Hypoglottis* of DeCandolle's Prodrumus, of Bunge's monograph, and of most European floras up to Lacaita's analysis of the Linnean mixture—cf. Nuov. Gior. Bot. It., N. Ser., 19: No. 3,—1912), from which DeCandolle distinguished it originally by its nearly glabrous foliage, long bracts, and white-hirsute calyx. Bunge (Astrag. Geront. 1:52 and 2:84, —1868–9) added to these characters calyx-teeth as long rather than half as long as the tube and ovules in 10–12 rather than 7–9 pairs. Gontscharov (l. c.) employed as key attributes of *A. dasyglottis* a calyx with teeth longer relative to the tube and pubescent with hairs long and white rather than short and of mixed colors, on the face of it a suspiciously feeble contrast. As a rule the short, subappressed vesture of the calyx in *A. danicus* contrasts abruptly with the rather stiff, spreading, hirsute or hirsutulous pubescence of the foliage, which is often a little denser on the upper than the lower surface of the leaflets; whereas in *A. dasyglottis* the leaflets are only thinly strigulose (and often glabrous above) in contrast with the villous-pilose inflorescence. In addition the stipules, bracts and calyx-teeth all average shorter in *A. danicus*, but since these commonly vary together, and are probably genetically linked, only one basic character is involved here. The supposed difference in ovule-number has proved less useful than Bunge anticipated, for we have counts of 14–26 in *A. dasyglottis* and 12–18 in *A. danicus*. A possibly significant smaller average number in the latter is correlated with a pod of slightly shorter and plumper outline, but there is no structural difference in the fruits. Color of the calyx-hairs is here, as everywhere in *Astragalus*, a feature without diagnostic value.

The Asiatic ranges of the two species overlap (according to Gontscharov, l. c.) widely, and I have seen a few specimens of *A. danicus* from Altai which suggest intergradation at least in the proportions and vesture of the calyx. They are not decisively intermediate, however, and the material at my disposal from the critical area is insufficient to illuminate the racial situation. Quite possibly the two species are ecologically isolated, for *A. danicus*, at least in far western Europe, occurs in

much drier environments than *A. dasyglottis* will tolerate in America. The fact remains, nevertheless, that the two species are so much alike in general aspect, in parallel ranges of variation, and in floral and carpological structure, that reduction of *A. dasyglottis* to subordinate rank under *A. danicus* would be logically justified. Some European botanists regard *A. danicus* itself as a variety of *A. Hypoglottis* L. emend Lac. [var. *danicus* (Retz.) Fiori & Paol., Nuov. Fl. Anal. It. 1:889,—1925], so the combination *A. Hypoglottis* var. *dasyglottis* must be borne in mind as appropriate to the American plant.

The differences that I have observed between the two species discussed are summarized below, and the synonymy of *A. dasyglottis* follows.

1. Herbage hirsutulous; calyx about 6.5–9 mm. long, loosely strigulose, the teeth 1.5–2.5 (3.5) mm. long; bracts mostly 2–3 mm., rarely up to 4.5 mm. long, commonly ovate; stipules 1.5–5 mm. long; ovules 12–18, rarely over 16; Europe to the Lena River and trans-Baikalia at least to long. 110° E. *A. danicus*
1. Herbage thinly strigulose-pilosulous with appressed or narrowly ascending hairs, often subglabrous; calyx (7.5) 8.5–12.5 mm. long, finely pilose with spreading hairs, the teeth (2.5) 3–5 mm. long; bracts 3–7 mm. long, commonly lanceolate-oblong; stipules 2–10 mm. long; ovules 14–26, rarely less than 18; eastern Asia, from the Lena Basin south to northern Sinkiang, and west through trans-Baikalia and Altai to the Tarbagatai Mts. at about long. 85° E.; also in North America, from Alaska to New Mexico, west to interior Washington, northeastern California, and southern Utah, east to James Bay in Ontario, southern Manitoba, and northern Iowa. . . . *A. dasyglottis*

ASTRAGALUS DASYGLOTTIS Fisch. ex DC., Prod. 2:282 (1825). *A. Hypoglottis* *β. dasyglottis* (Fisch.) Ledeb., Fl. Alt. 3:293 (1831). *A. agrestis* Dougl. ex G. Don (1832). *A. goniatus* Nutt. ex T. & G. (1838). *A. Hypoglottis* *β. (?) polyspermus* T. & G. (1838). *A. virgultulus* Sheld. (1894). *A. Hypoglottis* var. *bracteatus* Osterh. (1899). *A. Tarletonis* Rydb. (1901).

DOES LONICERA UTAHENSIS OCCUR IN CALIFORNIA? The inclusion of *Lonicera utahensis* Watson in Jepson's Manual (p. 968,—1925) was based on a collection sent in fresh condition from Yreka, Siskiyou County, California, by W. T. Mooney in late May, 1903. This was at first thought by Jepson to be new and was annotated and described by him as a new species, but the name was never published. Before the Manual was printed,

he had decided that the plant was enough like *L. utahensis* to be included under that name. Although Dr. Bacigalupi and doubtless others have searched for the plant around Yreka, it has never been recollected.

The Mooney specimen differs in so many significant respects from *L. utahensis* that it seemed to me to deserve separate recognition. The leaves are rather strikingly shaped like an elongated heart, the bracts of both inner and outer sets are larger than those of *L. utahensis*, and the corolla is much more deeply cleft, its limb more flaring, its tube more slender, and gibbosity less, and it completely lacks the flaring throat of the corollas of *L. utahensis*.

With the thought, however, that so pretty a plant might have been a garden introduction instead of a native, a search was made among foreign species. This search was successful. The Yreka plant is almost certainly *L. tatarica* L. (Sp. Pl. 1:173,—1753).

Since there is presumably no other evidence for the occurrence of *L. utahensis* in California, it may henceforth be omitted from any list of Californian species.—LAURAMAY T. DEMPSTER, the Jepson Herbarium, Department of Botany, University of California, Berkeley.

CAPE MARIGOLD ADVENTIVE IN CALIFORNIA. One of California's attractive cultivated plants that is escaping beyond the garden gate to become established locally along roadsides and in waste ground is *Dimorphotheca sinuata* DC. Commonly known as Cape Marigold, this bright-flowered annual from South Africa belongs to the same tribe of the Sunflower Family as the field marigold, *Calendula arvensis* L., but in *Calendula* the achenes are strongly incurved while in *Dimorphotheca* they are straight. The following collections, representing spontaneous occurrences of *D. sinuata* in California, are in the Herbarium of the California Academy of Sciences: Lakeside, San Diego Co., *Howell 30926*; near the lodge, Lake Arrowhead, San Bernardino Co., *Winblad in 1938*; Ventura Avenue, Ojai Valley, Ventura Co., *Pollard in 1945*; Grand Avenue, Ojai Valley, Ventura Co., *Pollard in 1947*; Hope Ranch near Santa Barbara, Santa Barbara Co., *Pollard in 1952*; on edge of alfalfa field, Lerdo Road just east of Shafter, Kern Co., *Twisselmann 4257*. J. T. HOWELL.

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ment, of the people of the San Francisco Bay Area, California and the Nation.

PHYSICAL FACILITIES

The Academy's facilities located in Golden Gate Park consist of the Hall of Science, Alexander F. Morrison Planetarium, May T. Morrison Auditorium, the North American Hall, the Simson African Hall, and the new wing containing the J. W. Mailliard, Jr., Library, the Alice Eastwood Hall of Botany, and the Norman B. Livermore Room. In addition, the Academy under the City Charter is charged with the responsibility of directing and supervising the operations of the Steinhart Aquarium.

This splendid group of buildings housing vast collections of great importance to a number of fields of natural science, accompanied by an unexcelled scientific library, administered by a highly competent and devoted scientific staff, has become an institution of incomparable value to the community.

ECONOMIC VALUE

The Academy attracts tremendous numbers of adults, as well as children. The total attendance currently exceeds two and one-quarter million persons annually. They come not only from the San Francisco Bay Area but also from California as a whole and also from many other states and foreign countries. These visitors spend substantial sums in San Francisco and contribute broadly to the general economic well-being of the community.

The California Academy of Sciences is not only a scientific and educational institution but also a most valuable economic asset to San Francisco and San Francisco business.

THE NEW WING

The new wing houses the *J. W. Mailliard, Jr., Library*, the *Alice Eastwood Hall of Botany*, and the *Norman B. Livermore Room*. All funds to cover construction and equipment of these new outstanding addi-

tions to the Academy have been received from private sources.

The late J. W. Mailliard, Jr. first became a member of the Academy in 1911. For more than 50 years and particularly from

1946 until his untimely death in 1953, during the greater part of which period he served as Chairman of the Board of Trustees, he fostered the development of a science library. Upon his death, it was learned that he had set up a Trust Fund for "a library building . . . or the enlargement or improvement of any existing library building." Thus from these funds supplemented by gifts donated in his memory, the *J. W. Mailliard, Jr., Library* has become a reality.

Now the Academy's more than 200,000 scientific and technical books and documents, one of the outstanding scientific collections in the Nation, will be readily available to students, scholars and scientists. Furthermore, these modern library facilities have been so designed as to supply substantial room for expansion in the future.

Alice Eastwood joined the Academy's staff in 1892. For more than 50 years she served as its Curator of Botany. During her lifetime she collected and filed in the Herbarium some 400,000 specimens of plants, and made many contributions to the literature of botany. Since her death in 1953, friends of the internationally known Curator of Botany, including many garden clubs,

not only in California but from all over the world have made donations in her memory. These funds have made possible the development of the new *Alice Eastwood Hall of Botany*.

Another lifelong friend of the Academy was Norman B. Livermore. He became a member in 1913, was elected a Trustee in 1929, and served as Chairman of the Board from 1938 to 1946. For many years the Academy has needed a meeting room for the California Botanical Club and other similar gatherings. Mr. Livermore helped develop the basic plans for the Eastwood Hall of Botany. Following his death, members of his family and their friends made donations to the Academy for the establishment of the *Norman B. Livermore Room*. It is entered through the Hall of Botany and is adjacent to the entrance to the Herbarium.

The new wing adjoins the Morrison Planetarium and the Hall of Science. It has been designed by Architect Milton Pfeuger to conform with the architectural plan of the other buildings. Rothschild, Raffin and Weirick of San Francisco were the general contractors.

ORGANIZATION OF THE ACADEMY

The Academy is governed by a Board of Trustees consisting of 25 individuals who serve without compensation. The day-to-day activities of the Academy are coordinated by a Director who has general supervision of 14 departments and related activities.

Except for the Aquarium and some of the scientific educational activities the work is maintained by donations, bequests and grants received from individuals, corporations and foundations. These are deductible under state and federal income tax laws.

Inquiries concerning the Academy and its various activities are solicited and should be addressed to the Director, Dr. Robert C. Miller, California Academy of Sciences, Golden Gate Park, San Francisco 18, California.

AFTER TEN YEARS: NAMES AND NOTES FOR THE MARIN FLORA

BY JOHN THOMAS HOWELL

December 21, 1959, will mark the tenth anniversary of the publication of *Marin Flora*,¹ and in recognition of the anniversary I have brought together various items of information pertaining to the plants of Marin County, California, that have come to my attention during the last decade. While I have gathered much of the information, I am grateful to many friends who have brought in specimens of new or rare Marin County plants, who have called to my attention the seemingly inevitable errors that creep into a floristic work, or who have contributed in other ways to the increase and perfecting of our knowledge. Specimens cited in these notes are deposited in the Herbarium of the California Academy of Sciences unless assigned elsewhere, and collection numbers are my own if not otherwise indicated.

ADDITIONS TO MARIN FLORA

In the last decade, 59 plants have been reported from Marin County that are not accounted for in *Marin Flora*, at least by name. Making up this number are 9 indigenous plants, 3 named hybrids, and 47 introduced plants.

ADIANTUM × *TRACYI* C. C. Hall ex Wagner. Tracy's maidenhair, a fern of hybrid origin between *A. Jordani* K. Muell. and *A. pedatum* L., has been reported as occurring in Bear Valley by Dr. W. H. Wagner (Madroño 13:196, 199,—1956).

CHEILANTHES CARLOTTA-HALLIAE Wagner & Gilbert. The lip-fern that is briefly noted in *Marin Flora* (p. 53) as intermediate between *C. californica* (Hook.) Mett. and *C. siliquosa* Max. is the plant that has been named in honor of Carlotta Case Hall (Mrs. Harvey Monroe Hall), long-time student of California ferns. On Mt. Tamalpais in the vicinity of Bootjack (which is the type locality), there is to be found such a variety of plants intermediate between *C. californica* and *C. siliquosa* that it is not always possible to tell where one leaves off and the other begins, and it is well nigh impossible to delimit the proposed

¹ *Marin Flora*. Manual of the Flowering Plants and Ferns of Marin County, California. By John Thomas Howell. Photographs by Charles T. Townsend. University of California Press, Berkeley and Los Angeles. 1949.

species from the numerous variations. Besides Marin County plants from Bootjack and Tiburon, Wagner and Gilbert cite collections of Mrs. Hall's lip-fern from San Benito and San Luis Obispo counties (Amer. Journ. Bot. 44:739,—1957).

CHEILANTHES COVILLEI Max. In Marin County I have found this rather wide-ranging western lip-fern only on exposed rocks near Bootjack, Mt. Tamalpais (33629, 34598). Compared with material from southern California, the Tamalpais plants exhibit scales that are somewhat more lacerate-ciliate on the margins, a condition suggesting introgression with *C. intertexta* (Max.) Max., which grows in the vicinity. Mt. Tamalpais (or Mt. Diablo, where I have also found the two ferns growing in areas adjacent to each other) might well be the place where an intensive study could be made to determine the genetic relationship between these two lip-ferns and their proper taxonomy.

PINUS ATTENUATA Lemmon. Following the last extensive fire on Mt. Tamalpais in 1945, the knobcone pine reproduced naturally and may now be counted as an established, introduced element in the flora. In that fire a small planting of the pine in the chaparral between Laurel Dell and Potrero Meadow was killed and in its place a number of small trees are thriving, with the largest now bearing cones.

PINUS RADIATA D. Don. In several places I have noted the Monterey pine growing spontaneously in the vicinity of planted trees: Sausalito, Mt. Tamalpais on the fire-break below West Point, Stinson Beach, Marshall. None of the individuals seen has been cone-bearing.

CUPRESSUS MACROCARPA Hartw. Monterey cypress is successfully colonizing a steep rocky road-cut near old planted trees in Sausalito (No. 35103). I have also seen vigorous young trees growing spontaneously on the east side of Tomales Bay near Marshall.

ECHINODORUS BERTEROI (Spreng.) Fassett. *E. cordifolius* of Calif. authors. Clumps of this aquatic plant have become established in the shallows of a small reservoir between Salmon Creek and Chileno Valley, 11 miles from Marshall on the road to Petaluma, No. 35119. Although the plants have been recently introduced to Marin County in a habitat prepared by man, I would count the species as part of the county's indigenous flora since its introduction has been effected by wild water-fowl.

AEGILOPS TRIUNCIALIS L. Reported from Marin County by Munz (Flora, p. 1507) as a "weed on range land." I saw this goat grass only as a roadside weed in the chaparral near the summit of Mt. Tamalpais (No. 29107), and there it has not persisted.

BROMUS CATHARTICUS Vahl. Along roadside in western part of Frank Valley, No. 35108.

BROMUS STAMINEUS Desv. This Chilean brome has been reported from Olema, Stinson Beach, and East Peak of Mt. Tamalpais by Raven (Leafl. West. Bot. 8:154).

BROMUS STERILIS L. Growing in beach sand at Shell Beach, No. 30150.

BROMUS TECTORUM L. var. *GLABRATUS* Spenner. In waste ground near Mountain Theater, Mt. Tamalpais, No. 30255.

ELYMUS CAPUT-MEDUSAE L. Chileno Valley, R. T. Straw, July 20, 1959 (CAS from Herb. Calif. Dept. Agr.).

ERAGROSTIS DIFFUSA Buckl. Garden weed, Ross, No. 30109; near town of Point Reyes, No. 35117.

FESTUCA ARUNDINACEA Schreb. On roadside near Olema, No. 30300; along trail between Bootjack and Mountain Theater, Mt. Tamalpais, No. 30257.

FESTUCA PRATENSIS Huds. *F. elatior* L. in part. Near Olema, David Morgan, Aug. 24, 1956. Not entirely typical and perhaps representing a cultivated strain of the meadow fescue.

SETARIA FABERII Herrm. Along Redwood Highway at Sonoma County line, David Morgan, Aug. 6, 1958. This is the first record of this Chinese grass that I have seen from California (or from western United States). It has become widespread in the eastern states from Nebraska and Arkansas east to the Atlantic.

SETARIA GLAUCA (L.) Beauv. Bootjack, Mt. Tamalpais, No. 30112; Redwood Highway at Sonoma County line, David Morgan, Aug. 6, 1958.

SETARIA VIRIDIS (L.) Beauv. Garden weed, Ross, No. 30110.

ALLIUM NEAPOLITANUM Cyr. Miss Annetta Carter first called my attention to the occurrence of the Neapolitan onion in Marin County in 1953 and in 1958 Mrs. Blanche Clear brought specimens to me from Larkspur where it was growing spontaneously in a garden (cf. Leafl. West. Bot. 8:248,—1958). Neither this species nor the even weedier *A. triquetrum* L. is listed by Munz in the California Flora (1959).

QUERCUS × *HOWELLII* Tucker. This is the arborescent shrub on the Fish Grade west of Phoenix Lake that was noted in Marin Flora, p. 116. It represents a cross between *Q. dumosa* Nutt. and *Q. Garryana* Dougl.

QUERCUS × *SUBCONVEXA* Tucker. This hybrid oak is derived from a cross between *Q. durata* Jeps. and *Q. Garryana* and was noted without name in Marin Flora, p. 115. It is occasional in serpentine areas in the vicinity of *Q. durata*.

CANNABIS SATIVA L. Occurring as a waif, Tiburon, W. C. Lewis, September, 1919.

CHENOPODIUM BERLANDIERI Moq. var. *ZSCHACKEI* (Murr) Murr. According to the determination by Dr. H. A. Wahl, this is the plant I reported in Marin Flora (p. 125) from San Antonio Creek as *C. album* L. (No. 15345). This variety is not listed in Munz' California Flora.

CHENOPODIUM STRICTUM Roth var. *GLAUCOPHYLLUM* (Aellen) Wahl. The "*C. album*" of Marin Flora from San Rafael (No. 21476) has been determined by Dr. Wahl as this widespread American goosefoot.

AMARANTHUS POWELLII Wats. Two species were treated under the name *Amaranthus hybridus* in Marin Flora: *A. hybridus* L., known to me in the county only from a specimen I collected in Fairfax (No. 17868); and *A. Powellii* Wats., from collections made in Mill Valley (No. 21554), Novato (No. 15341), and Inverness (No. 20726). I kept no specimen of the amaranth cited in the Flora as *A. hybridus* from Frank Valley, so I cannot tell which of the two species it was.

MIRABILIS JALAPA L. The garden four o'clock of California floras is scarcely more than a fugitive from cultivation, and as such it has been observed in Marin County,—as a waterfront waif in waste ground in Sausalito (No. 35102) and as a sidewalk weed in Tomales.

GLINUS LOTOIDES L. Common on the drying strand of Bon Tempe Reservoir in 1956, No. 31875, where it grew with two other aizoaceous annuals, *Cypselea humifusa* Turp. and *Mollugo verticillata* L.

LYCHNIS CORONARIA (L.) Desr. Elsewhere in this issue Peter Rubtzoff notes the adventitious occurrence of the mullein pink in Marin County and in other parts of California.

SCLERANTHUS ANNUUS L. This Old World weed has been collected by Beecher Crampton, *No. 4205*, at Forest Knolls.

BRASSICA JUNCEA (L.) Coss. The Indian mustard has already been reported as an addition to the Marin County flora (Leafl. West. Bot. 6:70,—1950). It was found in Blithedale Canyon, Mill Valley.

SEDUM ALBUM L. White stonecrop tends to become weedy where it is cultivated, as in the Bolinas garden of Mrs. James Jenkins (*No. 34605*).

COTONEASTER PANNOSA Franchet. More than a decade ago Mr. Henry M. Pollard observed the spontaneous reproduction of this cotoneaster near Stinson Beach and urged its inclusion in Marin Flora, but unfortunately I omitted it since I was not convinced that so exotic a plant would become naturalized. Today there are places about Stinson Beach where this attractive Chinese shrub forms open thickets and is almost as abundant as the native coyote bush (*No. 35109*). *Cotoneaster pannosa* has also been observed as a spontaneous plant on roadcuts in Sausalito (*No. 35104*) and at Marshall. It has been reported as spontaneous in Santa Barbara (Fl. S. B., p. 42) and San Francisco (Fl. S. F., p. 83). Mr. Pollard has sent us the following collections from southern California: bank of the Ventura River near its mouth, Ventura Co., *Pollard in 1947*; spontaneous in chaparral bordering Mountain Drive, Santa Barbara, Santa Barbara Co., *Pollard in 1955*.

MALUS SYLVESTRIS Mill. A seedling apple tree grows along the road in Frank Valley below Muir Woods (*No. 35106*). Scattered specimens of wild apple may be expected in most of the lower hills and valleys of California outside the desert regions.

PYRACANTHA ANGUSTIFOLIA (Franchet) Schneider. The narrow-leaved firethorn is occasionally spontaneous along fences near Stinson Beach (*No. 35111*).

CASSIA TOMENTOSA L. f. Spontaneous about plantings near the coast: Stinson Beach; Bolinas, *No. 34607*.

CERCIS OCCIDENTALIS Torr. A single plant of the redbud grows happily along the railroad-grade fire-road a short distance below West Point. Perhaps it was planted, but it has thrived without care or cultivation. The species is indigenous in the California Coast Ranges to the northeast of Marin County.

TRIFOLIUM INCARNATUM L. Crimson clover, a native of Europe, has already been reported for Marin County from the vicinity of Ignacio (Leaflet West. Bot. 8:144,—1957).

VIOLA TRICOLOR L. Adventitious and becoming quite prolific where cultivated: Bolinas, No. 34606. Records of other spontaneous occurrences in California are: Berkeley, Alameda Co., *Blanche Clear*; Johnsville, Plumas Co., *Howell 27653*; San Francisco (cf. Fl. S. F., p. 103).

EUGENIA APICULATA DC. The spontaneous occurrence of this attractive Chilean shrub at Bolinas was recorded in the Flora of San Francisco (p. 103).

GUNNERA CHILENSIS Lamk. This giant herb is perhaps the most exotic looking accession to the California flora in many a year. The plant is conspicuous in a sloping marshy meadow above Heart's Desire Beach in Tomales Bay State Park (No. 28293), whither the seeds must have been transported by birds from the garden of Mr. Hugh Logan in Inverness where the plant is cultivated, an airline distance of more than two miles. The plant is a feature in the Chilean section of the Strybing Arboretum in Golden Gate Park, but to the present time no notice of spontaneous reproduction in San Francisco has come to my attention.

CORIANDRUM SATIVUM L. Collected by J. P. Moore at Lagunitas in 1878 (CAS), coriander should have been known long enough as a garden escape in Marin County to have been included in the Flora. It was overlooked until we were checking the distribution of the herb for the Flora of San Francisco.

PETROSELINUM CRISPUM (Mill.) Mansfeld. In 1951 Peter H. Raven found parsley naturalized in Blithedale Canyon on Mt. Tamalpais and reported it the following year (Leaflet West. Bot. 6:204).

ARCTOSTAPHYLOS GLAUCA Lindl. A single shrub of big-berry manzanita grows on the railroad-grade fire-road in Fern Canyon on Mt. Tamalpais. As in the case of the redbud bush farther up the grade, one wonders if the occurrence is natural or not,—and yet who would purposely plant another manzanita on the slopes of Mt. Tamalpais where already six species are known to grow!

ARCTOSTAPHYLOS CUSHINGIANA Eastw. × *A. SENSITIVA* Jeps. A discussion of this putative hybrid which has been detected on Throckmorton Ridge, Mt. Tamalpais, has already been given in considerable detail (Leaflet West. Bot. 7: 265,—1955).

SALVIA GRAHAMII Benth. Plants in a large naturalized patch grow along the Waldo Grade in the Sausalito Hills (*Hugh Leach in 1957*). Two other records for this scarlet-flowered Mexican sage growing spontaneously in California are: Laguna Blanca School, Santa Barbara, *H. M. Pollard in 1952*; along roadside near Cunningham, Sonoma Co., *Howell 23225 in 1947*.

STACHYS ARVENSIS L. This annual European mint is reported as sparingly naturalized in Marin County by Epling (in Abrams Ill. Fl. Pac. States 3:631,—1951), a record based, embarrassingly enough, on *Howell 11809*, made in Ross in 1934!

SOLANUM LACINIATUM Ait. This handsome New Zealand species tends to become naturalized where it is cultivated near the coast and occasionally with the aid of birds it may stray far from its garden of origin. In Marin County it is known on Mt. Tamalpais along the road in Steep Ravine (*No. 32778*) and as an escape from cultivation in Bolinas (*Mrs. Jenkins in 1957*). The plant with which we are concerned has been reported in California botanical and horticultural literature as *S. aviculare* Forst. f., a related species from Australia. According to J. H. Willis of Melbourne, who examined our plant as it grows in Golden Gate Park, *S. laciniatum* differs from *S. aviculare* in the obtuse corolla-lobes and in the presence of conspicuous stone-cells in the ripe fruits. It is of interest to note that, whereas the fruits of the New Zealand plant were used by early settlers for preserves, the fruits of the Australian plant are not edible (cf. Fl. Austral. 4:447; Man. N. Zealand Fl. 481).

ASPERULA ODORATA L. The sweet woodruff or Waldmeister was found as an escape from cultivation at Ross by Eric Walther in 1923 (CAS). Although it has not been noticed more recently, it could easily pass as a *Galium* and it should be watched for. It is noted as an occasional introduction by Dr. Arthur Cronquist in the Pacific Northwest.

GALIUM SPURIUM L. The rare smooth-fruited typical form of this European species is the plant I suspected to be a hybrid between *G. tinctorium* and either *G. Aparine* or *G. spurium* var. *echinospermum* (Marin Flora, p. 253). Dr. Frederick Ehrendorfer called my attention to this mistaken interpretation.

AGOSERIS RETRORSA (Benth.) Greene. Dr. Quentin Jones has determined as this widespread western dandelion a collection made on Bolinas Ridge by Miss Eastwood (CAS).

ASTER SUBSPICATUS Nees. Amid the various forms of *A. chilensis* Nees that is so common in Marin County, the variable but

distinctive *A. subspicatus* (*A. Douglasii* Lindl.) became confusingly lost. Dr. Arthur Cronquist has indicated the Marin County occurrence of this species in the following collection: Mill Valley, *Howell 953*. Peter Rubtzoff has also made a Marin County collection: coastal bluffs near the lighthouse, Pt. Reyes, *No. 788*.

CALYCADENIA CILIOSA Greene. In 1952 I collected a single plant of this northern California species in the serpentine area east of Bootjack on Mt. Tamalpais. The species has not been seen there again (in a place where *C. multiglandulosa* var. *cephalotes* flourishes). Hence it may be regarded as a waif, though it should still be watched for.

CENTROMADIA PUNGENS (H. & A.) Greene. In 1951 this spike-weed was common along the road northwest of Olema (*No. 28294*). The variant involved is the so-called maritime form which has the name *C. maritima* Greene (*Hemizonia pungens* subsp. *maritima* Keck).

CNICUS BENEDICTUS L. A collection made in Mill Valley by Miss Eastwood in 1921 (CAS) vouches for the occurrence of the blessed thistle in Marin County.

GRINDELIA PROCERA Greene. I collected a waif-like plant of this species of interior parts of California near San Anselmo in 1933, *No. 11462*, but I overlooked it in accessioning the gum-weeds for Marin County. In recording this species here, I am following Steyermark, who separates *G. procera* from *G. camporum* Greene var. *parviflora* Steyer., rather than Keck (Calif. Fl., p. 1165) who combines the two.

HOLOCARPHA VIRGATA (Gray) Keck. This tarweed was found as a well-established introduction in meadows near Lake Lagunitas in 1956 (*No. 31876*).

MICROSERIS DECIPIENS Chambers. This species (otherwise known only from Monterey and Santa Cruz counties) was collected on serpentine south of Stinson Beach on the coast road (*No. 22098*).

PSILOCARPHUS TENELLUS Nutt. var. *TENUIS* (Eastw.) Cronquist. Locally common on a sandy flat near the radio station on Point Reyes Peninsula, *No. 28323*. This coastal occurrence (as well as specimens from Monterey) considerably extends the distribution of this distinctive plant beyond the range given in the California Flora (p. 1265).

PLANTS REPORTED FOR MARIN COUNTY
BUT DOUBTFULLY PRESENT

The following plants, although reported as occurring in Marin County by various authors, were not included in Marin Flora, and even yet I have no evidence that they should have been included.

On the other hand, *Bromus racemosus* L. (Marin Flora, p. 67) is to be excluded from our flora (cf. account by Peter Rubt-zoff elsewhere in this issue).

TSUGA HETEROPHYLLA (Raf.) Sarg. Although one may doubt that the western hemlock is to be found south of Sonoma County, nevertheless Sudworth's record of it as occurring "sparingly in Marin County" (Forest Trees Pacific Slope, p. 94) should not be dismissed as beyond the realm of possibility.

AGROPYRON JUNCEUM (L.) Beauv. Reported from Tocaloma by W. W. Robbins (U. C. Agr. Exp. Sta. Bull. No. 637, p. 17,—1940), but the record is not repeated in Weeds of California (p. 36,—1941).

CEANOTHUS PARRYI Trel. According to McMinn (Ill. Man. Calif. Shrubs, p. 300,—1939) and Abrams (Ill. Fl. Pac. States 3:68,—1951), Parry's ceanothus ranges southward into Marin County. I have not seen a specimen from our area and Munz (Calif. Fl., p. 980) excludes Marin County from his distributional data.

PHACELIA RAMOSISSIMA Dougl. Although the presence of this species in Marin County is indicated by Jepson (Fl. Calif. 3:258, in discussion) and by Munz (Aliso 4:97; Calif. Fl., p. 529, as var. *montereyensis* Munz), no plant referable to it has ever come to my attention from Marin County, either in the field or in the herbarium.

NOTEWORTHY RANGE EXTENSIONS

When I discussed the relationship between the flora of Marin County and the flora of the Coast Ranges (Marin Flora, pp. 23-27), I emphasized the considerable number of species whose northern or southern limits of distribution fell within the county. In the last ten years, as the result of extended field work in the Coast Ranges, the distributional limits of some of these plants are now known to be either to the north or south of Marin County. The data for several of these critical and important range extensions come from the careful field studies of Miss Vesta F. Hesse in the Santa Cruz Mountains.

GLYCERIA LEPTOSTACHYA Buckl. San Francisco, *N. J. Anderson in 1852*.

MELICA GEYERI Munro var. ARISTULATA J. T. Howell. Whiskey Saddle west of Paskenta, Tehama Co., *Crampton 1964*.

PHLEUM COMMUTATUM Gaud. *P. alpinum* of Marin Fl. Reported from San Francisco by K. Brandegee (as *P. alpinum*, *Zoe 2:379*,—1892).

CAREX LANUGINOSA Michx. Occasional in the South Coast Ranges: Mt. Diablo, *Bowerman 3000*; Camp Evers, Santa Cruz Mts., *Hesse 460, 609*; San Luis Obispo Co., *Eastwood & Howell 3871, 4158*.

CAREX VICARIA Bailey. Santa Cruz Mts., *Hesse 594, 608, 1636*.

JUNCUS SPHAEROCARPUS Nees. Besides the record cited in Marin Flora (p. 99), I know of only the following two records in the Coast Ranges south of Marin County: Mt. Hamilton (*Amer. Midl. Nat. 34: 331*,—1945); near Estrella, San Luis Obispo Co., *Eastwood & Howell 4199*. It can be expected almost anywhere in the Coast Ranges, but it remains a rare or rarely detected plant.

MAIANTHEMUM DILATATUM (Wood) Nels. & Macbr. Cultivated in San Francisco by Mrs. E. J. Rebert who says that the rootstocks were collected on Pescadero Creek, San Mateo Co.

MUILLA MARITIMA (Torr.) Wats. I overlooked North Coast Range collections of this plant, and a couple are more recent: near Calistoga, *Eastwood, Howell, Raven*; between Cotati and Santa Rosa, *Raven 1567*; Vacaville (Jepson, *Fl. Calif. 1:280*).

GOODYERA OBLONGIFOLIA Raf. The southward extension of the rattlesnake plantain to the Santa Cruz Mts. is established by the following collection: Foreman Creek Canyon, near Boulder Creek, el. about 800 ft., *Hesse 2741 (DS)*.

CHENOPodium MACROSPERMUM Hook. f. var. FARINOSUM (Wats.) J. T. Howell. Dr. Munz (*Calif. Fl.*, p. 370) extends the range northward to Humboldt County. In 1951 I found a second station for this rare Marin County plant: muddy flats bordering the lagoon at the Drake Memorial near Pt. Reyes, *No. 28296*.

THYSANOCARPUS LACINIATUS Nutt. var. CRENATUS Brew. West of Paskenta, Tehama Co., *Wagnon 12663*, in 1953.

SIDALCEA RHIZOMATA Jeps. Listed in Marin Flora as an endemic on Pt. Reyes Peninsula (p. 27) and treated in this restricted way by Mason (*Calif. Marsh Fl.* p. 575) and by Munz (*Calif. Fl.*, p. 132), this plant occurs in coastal Mendocino

County: 1 mile north of Navarro River, *Peirson 3773*; 1 mile north of Elk, *Howell No. 29116*; 4 miles south of Pt. Arena, *Howell 29124*.

EPILOBIUM HALLEANUM Hausskn. The occurrence of this species in the Santa Cruz Mts. has already been noted by Dr. John H. Thomas (Leaflet West. Bot. 9:32).

LUDWIGIA PALUSTRIS (L.) Ell. var. *PACIFICA* Fern. & Griseb. Camp Evers, Santa Cruz Mts., *Hesse 1396*.

CAMPANULA CALIFORNICA (Kell.) Heller. The California bell-flower has also been found at Camp Evers by Miss Hesse, *No. 835* (JEPS).

MISCELLANEOUS NOTES AND NOTEWORTHY RECORDS FOR MARIN COUNTY PLANTS

PINUS MURICATA D. Don. On Mt. Tamalpais the bishop pine has been known only as a tree in the small groves of conifers that have been planted in several places on the mountain. It is now abundantly naturalized and the young trees are cone-bearing along the fire-break that traverses the plantation below West Point.

SEQUOIA SEMPERVIRENS (Lamb.) Endl. A notable station for the redwood in Marin County is discussed elsewhere in this issue by Mr. A. J. Galloway.

TAXUS BREVIFOLIA Nutt. In April, 1958, Robert H. Menzies and James Roof discovered a colony of the western yew near the north boundary of Samuel P. Taylor State Park.

TYPHA ANGUSTIFOLIA L. The narrow-leaved cat-tail was collected in 1959 at Santa Venetia by Peter Rubtsoff, *No. 4217*. He reported that it grew with *T. domingensis* Pers. and *T. latifolia* L.; hence it may be expected that hybrids between these species will be found in that district.

• *TYPHA DOMINGENSIS* Pers. Previously known in Marin County from Phoenix Lake and from marshes bordering the bay at Burdell (p. 58), this cat-tail has been collected by Peter Rubtsoff in a ditch near the Redwood Highway about 0.5 mile south of Novato Creek (*No. 3898*) and in low ground in Santa Venetia (*No. 4216*).

DAMASONIUM CALIFORNICUM Torr. Heretofore this plant has been known in Marin County only from a single locality at the Sonoma County line on the road from Petaluma to Tomales (p. 61). In 1959 Peter Rubtsoff collected it at another station on

the Sonoma County line: from the moist bank of San Antonio Creek (on the Marin County side) near the road from Chileno Valley to Petaluma, *No. 4192*.

CALYPSO BULBOSA (L.) Oakes. The calypso has been found on the south side of Mt. Tamalpais southeast of Pan-Toll under Douglas firs, *David Brewer*, April, 1951.

CASTANOPSIS CHRYSOPHYLLA (Dougl.) A. DC. The typical arboreous variant of the chinquapin, with a height of 50 feet and a trunk diameter of 20 inches, has been reported from Second Valley, Inverness.

LINUM CONGESTUM Gray. This rare species is represented in the University of California Herbarium by a collection from Carson Ridge, *F. Hoffman 2694*.

AMMANNIA COCCINEA Rottb. New man-made ponds are furnishing this plant with fresh strands to colonize: pond just north of Point Reyes (town), *No. 35118*; pond, 11 miles from Marshall on road to Petaluma, *No. 35120*.

PITYOPUS CALIFORNICUS (Eastw.) Copel. f. This rare saprophyte was discovered on June 1, 1957, by Malcolm and Laura Smith on the Kent Trail near the East Fork of Swede George Creek on the north slope of Mt. Tamalpais. The plants were few in number and grew in humus beneath redwoods and Douglas firs.

RHODODENDRON MACROPHYLLUM G. Don. In 1959, Barbara Shurfey and Anne Leary found the western rhododendron on Bolinas Ridge, "1.5 miles north of the Bolinas-Fairfax summit."

PHACELIA BIOLETTII Greene. Because I thought that "Sequoia Canyon," the type locality that Greene gave for his species, was in the Oakland Hills (cf. *Amer. Midl. Nat.* 30:19,—1943), I did not treat the name in *Marin Flora*. As Jepson correctly notes (in *Fl. Calif.* 3:250,—1943), "the 'Sequoia Cañon' of Michener & Bioletti is Redwood Cañon of Muir Woods, Mt. Tamalpais, not 'Oakland Hills'." The plant with which we are concerned here was also described from Mt. Tamalpais as *P. magellanica* (Lamk.) Cov. fma. *Jepsonii* Brand, not from Angel Island (where the plant also grows) as is inferred by the wording in *Marin Flora* (p. 228). Although I regard these two types as representing the same entity, Jepson refers *P. Biolettii* to *P. nemoralis* Greene (op. cit., p. 250) and *P. magellanica* fma. *Jepsonii* to *P. magellanica* var. *californica* (Cham.) Jeps. & Bailey (op. cit., p. 249). I believe the plant is a variant of *P. californica*

Cham., although both Constance (in Abrams Fl. 3:500) and Munz (Calif. Fl., p. 534) follow Jepson in the disposition of Greene's name.

BOSCHNIAKIA STROBILACEA Gray. In 1958, several small shoots of this odd broom-rape grew from the burl of a plant of *Arctostaphylos glandulosa* Eastw. at West Point Inn on Mt. Tamalpais. The plant did not reappear in 1959. In the Santa Cruz Mts., Vesta Hesse has verified the report that this species is parasitic on madroño.

OROBANCHE UNIFLORA L. Two Marin County specimens of this plant in the Jepson Herbarium are: Wheeler Trail, Mt. Tamalpais, Zeile in 1926; Bolinas Ridge, *Bacigalupi* 3254.

PLANTAGO FIRMA Kunze. What is probably the first collection of this species in California is one in the University of California Herbarium: near Fairfax, Marin Co., *Alice Eastwood*, April, 1896.

A FEW MISDETERMINATIONS

In the decade that has elapsed since Marin Flora was published, productive activity resulting in works concerned with or affecting the taxonomy of American vascular plants has reached a high point both in the preparation of local and regional floras, and in the published results of monographic and cytotoxic studies. All this work is bound to have a marked effect on the nomenclature used in any flora, and in our own case I estimate that perhaps as many as one-fifth of the names in Marin Flora might be altered if all proposed name-changes were accepted. It is not feasible to attempt even a bare list of these name-changes here; most of them can be found in such local floras as *A Flora of Santa Barbara* by Clifton F. Smith (1952), *A Phytogeographical Analysis of the Pitkin Marsh* by Peter Rubtzoff (1953), *A Flora of the Temblor Range and the Neighboring Part of the San Joaquin Valley* by Ernest C. Twisselmann (1956), and *A Flora of San Francisco* by Howell, Raven, and Rubtzoff (1958); or in more general western floras such as *Arizona Flora* by Kearney and Peebles (1951), *Illustrated Flora of the Pacific States* by L. R. Abrams (vol. 3, 1951), *Vascular Plants of the Pacific Northwest* by Hitchcock, Cronquist, Ownbey, and Thompson (pt. 5, 1955; pt. 4, 1959), *Flora of the Marshes of California* by Herbert L. Mason (1957), and *California Flora* by Munz and Keck (1959).

Although I am not listing all the name-changes possible at

this time, I do wish to list several of those names that are patently wrong, names that reflect mistakes made in determining Marin plant collections. These are:

SAGITTARIA LATIFOLIA (at least in part) = *S. CUNEATA* Sheld. (*vide* P. Rubtsoff *ined.*).

ECHEVERIA CAESPITOSA = *E. FARINOSA* Lindl.

LUPINUS RIVULARIS = *L. PROPINQUUS* Greene (which is probably a variant of *L. arboreus* Sims).

CASTILLEJA AFFINIS = *C. FRANCISCANA* Pennell.

CASTILLEJA DOUGLASHI = *C. AFFINIS* H. & A. (*vide* R. Bacigalupi).

ERRORS IN EPITHETS

In at least two instances, wrong epithets were used in Marin Flora, thereby making names which neither reflected the intention of the authors to whom the names were ascribed nor expressed the correct nominal end for which I was striving. As I have already pointed out (Leaflet West. Bot. 6:69,—1950), *Pelargonium* "*grossulariaefolium* Ait." (Marin Fl., p. 180) should have been *P. grossularioides* (L.) Ait. The second erroneous name used was in *Mimulus* (p. 242), where *M. nasutus* Greene "*var. eximius* (Greene) Grant" should have been *M. nasutus* var. *insignis* (Greene) Grant. This error has been noted in the Gray Herbarium Card Index, issue 216.

REDWOODS ON POINT REYES PENINSULA

BY A. J. GALLOWAY

California Academy of Sciences

During my current geological work on the Point Reyes Peninsula, Marin County, California, I received reports of groves of *Sequoia sempervirens* in the area. Since it has been generally believed, by myself and others, that redwoods did not occur on the Point Reyes Peninsula (west of the San Andreas fault), I ran these reports down and found that they referred to one group of trees. This grove lies northwest of the Texeira ranch house, some 2000 feet west and 300 feet north of B.M. 175 which is on the Bolinas-Olema road approximately 3000 feet northwest of Woodville on the Bolinas 7½-minute U. S. G. S. topographic quadrangle.

The redwoods occupy a gulch which here runs into Pine Gulch Creek from the west, they also spread along the two

adjacent ridges and north and south along Pine Gulch Creek. On vertical aerial photographs they can be fairly readily distinguished from the Douglas fir which surrounds them on three sides.

The trees are mostly second growth stump sprouts, presumably about 100 years old since the timber in this vicinity was cut about that long ago. They form fine trees over 100 feet high. Scattered through the grove are the enormous stumps of the old trees, some of them cut off as high as 10 to 15 feet above the ground. Measurement of one of these old stumps gave a circumference of 33 feet 4 inches about four feet above the ground level. Another old stump which has been reduced to a shell by fire has a diameter of 14 feet.

These redwoods are definitely west of the 1906 earthquake fault trace as described by Gilbert. But are they "west of the San Andreas fault"? Lineaments in the topography in the neighborhood suggest that they are still in the San Andreas zone which here is at least 2000 feet wide. Perhaps they should be regarded as "colonizers" from east of the fault zone, particularly since they are on the younger sediments that are found west of the fault, not on Franciscan rocks that are found east of the fault.

ON THE SMOOTH-SPIKED FORM OF BROMUS MOLLIS IN MARIN COUNTY AND SAN FRANCISCO, CALIFORNIA

BY PETER RUBTZOFF

What appears to be merely a smooth-spiked form of soft chess, *Bromus mollis* L. forma *leiostachys* (Hartman) Fernald, has been treated under the name *B. racemosus* in Marin Flora (Howell, 1949, p. 67). Although he placed the plants under *B. racemosus*, a different species, Howell was aware of their similarity to *B. mollis* in that he stated: "As understood here, *B. racemosus* seems scarcely more than a glabrous form of *B. mollis*." Actually, whereas most of the collection from the Rock Spring area, one of the stations for this form in Marin County, represents fma. *leiostachys*, some typical *B. mollis* is intermixed.

Bromus racemosus should be excluded from the flora of Marin County.

In A Flora of San Francisco (Howell, Raven, and Rubtzoff, 1958, p. 33), the smooth-spiked form of *B. mollis* has been erroneously treated under the name "*Bromus mollis* subsp. *Thominii* (Harden) Hylander." Actually several mistakes were involved in this treatment: 1. The name, as originally intended, should have been *B. hordeaceus* Linnaeus subsp. *Thominii* (Hardouin) Hylander [as the name occurs in the Flora it should have had the authorship (Hardouin) Ascherson & Graebner]; 2. Most of the material treated under this name actually appears to be *B. mollis* forma *leiostachys* (Hartm.) Fern. (*Raven* 6812, 6842); 3. Part of the material treated under this name seems to be merely a variant of *B. mollis* with somewhat shorter pubescence (*Raven* 8234). It may also be noted that Howell's collection 32572 treated under *B. mollis* in A Flora of San Francisco consists partly of typical *B. mollis* and partly of forma *leiostachys*.

Bromus hordeaceus subsp. *Thominii* (*B. Thominii* Hardouin), an uncommon plant of Atlantic Europe, should be excluded from the San Francisco list.

The principal synonymy of the smooth-spiked form of *B. mollis* is as follows:

BROMUS MOLLIS L. forma *LEIOSTACHYS* (Hartman) Fernald, *Rhodora* 35:316, (1933). (This name is applied by Fernald in Gray's Manual of Botany,—1950.) *B. mollis* L. *B. leiostachys* Hartman, Handb. Skand. Fl. ed. 2:33 (1832). *B. hordeaceus* L. ssp. *mollis* (L.) Hylander fma. *leiostachys* (Hartman) Hylander, Uppsala Univ. Årssk. 1945, No. 7:84 (1945). For further synonymy see Holmberg, *Botaniska Notiser* 1924, p. 325.

BAMBOO FLOWERING IN MARIN COUNTY

BY BEECHER CRAMPTON

University of California, Davis

The flowering in bamboo is a rare occurrence. Groves, in their native habitats, are known to flower only once in 25 to 30 years and the species brought under cultivation seem to respond in a similar way. In 1958, in Marin County, California, a bamboo of the genus *Phyllostachys* was known to be flowering in three locations, two in Kentfield, and a third in Bolinas.

Attention was first directed towards this phenomenon by the interest of Mrs. Jane Wheelwright of Kentfield, who had a sizeable grove of this bamboo in complete flower in August, 1958. The upper two-thirds of each culm was a gigantic inflorescence, mostly devoid of leaves. Since the culms are 15 to 35, or even 40 ft. high (and from 1 to 3 inches thick at the base), this is a magnificent sight. According to Mrs. Wheelwright, flower initiation began about July, 1957, when the spikelets emerged and leaves began to fall. One year later, flowering was complete and the branches leafless.

The garden of Mrs. W. W. Davison, Kentfield, Marin County, has three clumps of the same bamboo, but from a different source. The culms are 8 to 12 ft. high and were in active flowering, though with some leaves present on younger shoots or branches. Mrs. Davison noted immediate floral initiation after the heavy spring rains of March and April, 1958.

At Bolinas, a small clump, the remainder of a considerable grove, was intermittently flowering. According to Dr. Dorothy Atkinson, former owner of the property, flowering has been rather sporadic over the last three years. Rhizomes from this grove were the source of the Wheelwright clump in Kentfield.

According to J. R. Haun, Horticulturalist, United States Department of Agriculture at Beltsville, Maryland, the bamboos are all *Phyllostachys bambusoides* Sieb. & Zucc., as determined from material collected and sent from Marin County.

SELAGINELLA BIGELOVII NOT ON MT. TAMALPAIS, CALIFORNIA. Bigelow's moss-fern has been credited to Mt. Tamalpais, Marin County, California, by the following collection: "0.5 mile east of Toll Gate, on fire road; abundant on open steep rocky slopes . . .", *A. A. Beetle 1566* (CAS, UC). The toll gate referred to was formerly in the area now designated as Pan-Toll, from which the fire road extends eastward past the Sargent cypresses to West Point. The plant concerned is the unmistakably distinct *S. Bigelovii* Underw., and, judging from the labels, the specimens I have seen were distributed by both the Gray Herbarium and the United States National Herbarium.

On a number of occasions I have searched for Bigelow's moss-fern on the rocks that are indicated but I have found only *S.*

Wallacei Hieron., and that species is abundant there. Thinking there may have been a mixup of materials, I looked in the University of California Herbarium for a Beetle collection of *S. Wallacei* from Mt. Tamalpais and not only did I find one but it bore the same locality data and collection number.¹ Somewhere along the line, a collection of *S. Bigelovii* has become mixed with *S. Wallacei* under *Beetle 1566*,—for I am as sure as I can be that the material of *S. Bigelovii* did not come from Mt. Tamalpais!—J. T. HOWELL.

CONCERNING LYCHNIS CORONARIA IN CALIFORNIA. *Lychnis Coronaria* (L.) Desrousseaux, listed in the Flora of the Pacific States (Abrams, 1944) as “an escape from gardens in Oregon and Washington”, has been reported in recent years as growing spontaneously in California. It is included in A California Flora by Munz and Keck (1959) with the remark: “Occasional as escape from gardens”.

There is an old Rattan specimen from California at the Dudley Herbarium. The rest of the material known to the writer, however, seems to indicate that the plant became more widespread in the state as a weed in recent years.

The information in local floras and the specimens known to the writer may throw some light on the present-day spontaneous dispersal and habitats in California of this native of southern Europe, Asia Minor, and central Asia. The specimens, except the Rattan specimen, are at the California Academy of Sciences.

Hoopa Valley, Humboldt Co., 1878 (Rattan Herbarium, DS; det. by Mrs. R. S. Ferris in 1939). Infrequent perennial as escape in clearing in Mixed Evergreen Forest, Boise Creek Public Camp west of Willow Creek, Humboldt Co., alt. 1200 ft., June 27, 1952, *Munz 17799*. St. Helena to Howell Mt., Napa Co., elev. about 300 ft., May 26, 1952, *Raven 4032*. Hill-slope above road, East Guernewood, near Guerneville, Sonoma Co., June 19, 1954, *Rubtsoff 1498*. Locally adventive in brush along old railroad grade above Camp Eastwood, Mt. Tamalpais, Marin Co., July 26, 1953, *Howell 29125*. “Locally established about gardents, Richmond district” (Howell, Raven, and Rubtsoff, A Flora of San Francisco, 1958). “Reported as an escape in Kinevan Cañon, San Marcos Pass” (Smith, A Flora of Santa Barbara, 1952). Kinevan Ranch, San Marcos Pass, Santa Barbara, June 6, 1958, *Pollard*. Wawona, Yosemite National Park, el. 4000 ft., *Rose 59093* in 1959.

—PETER RUBTZOFF.

¹ Minor discrepancies in the data should be noted: Whereas *S. Bigelovii* is said to have been collected at an altitude of 500 feet on June 21, 1940, the data for *S. Wallacei* are correct in giving the altitude as 500 m. and the date as Jan. 21, 1940.

PLANT RECORDS FOR THE SANTA CRUZ MOUNTAINS. The specimens listed below, which were collected in Santa Cruz County during the latter half of 1958, are apparently new records for the Santa Cruz Mountains. All except the last were growing on the mud flats at Pinto Lake near Freedom, a suburb of Watsonville, where their growth was doubtless promoted by the unusually long dry autumn. These records together with my collection numbers are:

ERAGROSTIS HYPNOIDES (Lam.) B. S. P. No. 2555.

ELEOCHARIS OBTUSA (Willd.) Schult. No. 2554, No. 2563.

POLYGONUM HYDROPIPEROIDES Michx. No. 2552.

CHENOPODIUM HUMILE Hook. No. 2553, No. 2567.

LINDERNIA ANAGALLIDEA (Michx.) Pennell. No. 2566.

CHENOPODIUM PUMILIO R. Br. In a pasture near Camp Evers, about 5 miles north of Santa Cruz, No. 2524.—V. F. HESSE, Boulder Creek, California.

CALYPTRIDIMUM PARRYI IN BAJA CALIFORNIA. The spring of 1958 was an especially favorable one for collecting ephemeral annual plants in Baja California, Mexico, due to the heavy precipitation of the preceding winter season. One of the interesting discoveries of the year was made 1.9 kilometers east of Rancho Arenoso, where a few plants of *Calyptridium Parryi* Gray var. *arizonicum* J. T. Howell were found growing in the sandy desert washes (Raven, Mathias, & Turner 12,549, CAS, UC, GH), together with *Phacelia affinis*, *Coreocarpus Shrevei*, *Polygala desertorum*, *Astragalus*, and *Franseria dumosa*. This distinctive variety of *Calyptridium Parryi*, which is itself largely confined to the state of California, is thus known from southern Arizona and from north-central Baja California (J. H. Thomas, Leaflet West. Bot. 8:9–11,—1956). The fact that this most distinctive variety of the species has a rather wide and disjunct distribution suggests that it might well be accorded specific status, but the present taxonomy reflects better, at least for the time being, the community of characters that it shares with the species *C. Parryi* and its less distinct infraspecific taxa.—PETER H. RAVEN, University of California, Los Angeles.

TWO NEW COMBINATIONS IN CASTILLEJA

BY GABRIEL EDWIN

Washington, D.C.

The following combinations are based mostly upon studies of material collected in Nevada.

Castilleja rubida Piper var. **monoensis** (Jepson) Edwin, comb. nov. *C. nana* Eastw. (1902). *C. inconspicua* A. Nels. & Kenn. (1906). *C. ambigua* M. E. Jones (1908), non Hook. & Arn. (1833). *Orthocarpus pilosus* Wats. var. *monoensis* Jepson, Man. Fl. Pl. Calif. 940 (1925).

The publication of *Castilleja rubida* Piper (1900) clearly predates *C. nana* Eastw., of which *Orthocarpus pilosus* var. *monoensis* Jepson is a synonym. The only constant difference between the two taxa seems to be in the cleavages of the calyx. In *C. rubida* the calyx is cleft equally medianly and laterally, more than halfway. In *C. rubida* var. *monoensis* the median cleavage of the calyx is halfway. The lateral cleavage is shorter. This seems to me to be insufficient difference to retain *C. nana* as a species. It is reduced to a variety of *C. rubida*, where it appears to belong.

Castilleja pallescens (Gray) Greenman var. **inverta** Edwin, comb. nov. *C. fasciculata* var. *inverta* A. Nels. & Macbr., Bot. Gaz. 55:381 (1913). *C. pilosa* var. *inverta* A. Nels. & Macbr. (1916). *C. inverta* (A. Nels. & Macbr.) Pennell & Ownbey (1952).

Castilleja pallescens (Gray) Greenm. (1898) clearly predates *C. fasciculata* var. *inverta* A. Nels. & Macbr. (1913). There is little constant difference between the taxa. *Castilleja pallescens* var. *inverta* is shorter and has more strongly nerved bracts and shorter puberulence. There are small but inconstant differences in the relative sizes of calyx and corolla and of corolla-lip and galea. All these differences are not clear-cut enough to warrant the retention of *C. inverta*.

Castilleja oresbia Greenm. (1909) does not occur in Nevada and is not considered further here. It is, however, closely related to *C. pallescens* and *C. pallescens* var. *inverta*. It would probably be best to consider *C. oresbia* as another variety of *C. pallescens*.

U. S. National Arboretum,
Washington 25, D.C.

LEAFLETS *of* WESTERN BOTANY

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SAN FRANCISCO, CALIFORNIA

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NOTES ON FRESH-WATER MARSH AND
AQUATIC PLANTS IN CALIFORNIA—I

BY PETER RUBTZOFF

Work is in progress by the writer on a floristic and phyto-geographic study of fresh-water marshes in southern Sonoma County, California. It has been decided to publish partial data of particular interest in a series of notes, rather than to wait with their publication until the entire detailed study is completed. Also data on streambank, lakeshore, and aquatic plants will be included in these notes, as well as some data on plants from areas outside of southern Sonoma County.

It has been expedient to give names to the marshes which have not been named even on the detailed topographic maps by the Geological Survey, U. S. Department of the Interior, or by the Corps of Engineers, U. S. Army. Therefore a list of marshy areas in southern Sonoma County with their locations is included, as well as a map of the region. Preceding this list, however, a brief description of the area will be given.

The area is located in southern Sonoma County, California, approximately between the lower Russian River in the north and northern Marin County in the south, and between the Pacific coast in the west and the Sonoma Valley in the east. The relatively low elevation of the outer Coast Ranges in this region makes the oceanic influence perceptible much farther inland than in adjoining regions to the north and to the south. Consequently, inland from the immediate coast, summers are cooler than north and south of the area. However, within the area we still find a gradual decrease of oceanic influence in the direction from west to east. A table, comparing temperatures of the central part of this region with those of regions to the north has been given in Rubtzoff, 1953, p. 207.

The region is rich in fresh-water marshes, a list of which, as far as they are known to the writer, is given below (numbers in parentheses following names refer to map).

Russian River Mouth Marsh (1). On the south bank of the Russian River about $\frac{1}{2}$ mile upstream from the mouth (opposite Jenner and Penny Island).

Willow Creek Marsh (2). Farther up the Russian River, along lower

Willow Creek (a southern tributary of the Russian River), 0.6 mile north-east of the State Highway 1 crossing of the Russian River.

Lower Salmon Creek Marsh (3). At the mouth of Salmon Creek, near the town of Salmon Creek on Highway 1.

Coleman Marsh (4). On the north side of Salmon Creek about 1 mile upstream from Highway 1 crossing of the creek. So named because of Coleman Hill and Coleman Valley Road in the vicinity.

Bodega Bay Marsh (5). Just north of the town of Bodega Bay on Highway 1.

Bodega Harbor Marsh (6). At the head of Bodega Harbor $\frac{3}{4}$ mile west of the town of Bodega Bay.

Bodega Head Marsh (7). On the Bodega Head, 1 mile airline and about 2 miles on road southwest of the town of Bodega Bay.

Brooks Gulch Marsh (8). In lower portion of Brooks Gulch, about 1 mile southeast of the town of Bodega Bay on Highway 1.

Duncans Mills Marsh (9). Just north of the town of Duncans Mills on State Highway 12, along lower Orrs Creek.

Austin Creek Marsh (10). Northeast of the preceding on Highway 12, near lower Austin Creek.

Fife Creek Marsh (11). Along lower Fife Creek, just north of Guerneville.

Guerneville Marsh (12). About $\frac{1}{2}$ mile southeast of Guerneville, in the lower part of Mays Canyon and the adjacent parts of Pocket Canyon.

Occidental Marsh (13). About $\frac{3}{4}$ mile northeast of Occidental on the Occidental-Graton road.

Freestone Marsh (14). About 1 mile northwest of Freestone, on the road to Occidental.

Americano Creek area. There are some marshy spots along Americano Creek in the Valley Ford-Bloomfield region (southern part of map).

Forestville Marsh (15). About $\frac{1}{2}$ mile east of Forestville.

Pitkin Marsh (16). About $1\frac{1}{2}$ miles southeast of Forestville, east of Highway 12 (discussed in detail in Rubtsoff, 1953).

Ross Marsh (17). Near the Ross Station Road crossing of the Green Valley Creek, 1 mile southwest of Highway 12, $\frac{1}{2}$ mile southwest of Ross.

Atascadero Creek Marsh (18). About 1 mile northwest of Graton along lower Atascadero Creek, a tributary of the Green Valley Creek.

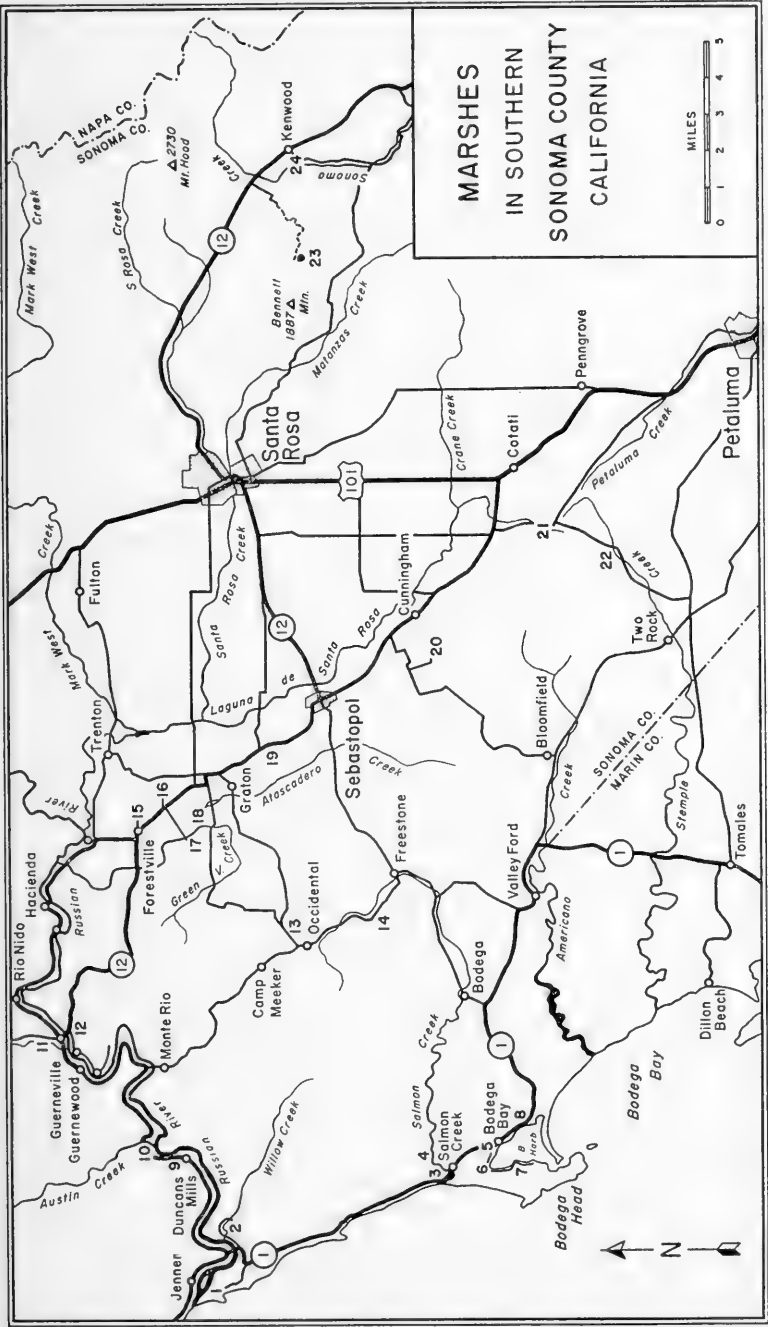
Perry Marsh (19). Near Molino, 2 miles northwest of Sebastopol (Rubtsoff, 1953, p. 130).

Cunningham Marsh (20). About 3 miles airline south-southeast of Sebastopol or 1 mile southwest of Cunningham. On the map in Rubtsoff, 1953, p. 132, the position of the Cunningham Marsh is incorrect; it should be actually $\frac{1}{2}$ mile to the southeast of the position indicated there.

Stony Point Marsh (21). On Stony Point Road about $\frac{1}{4}$ mile north of Stony Point (about 2 miles airline southwest of Cotati).

Upper Stemple Creek Marsh (22). About 2 miles south of the preceding, along upper Stemple Creek near Cherry.

Laguna de Santa Rosa. This is a sluggish stream flowing in a southeast-northwest direction through the middle of the area shown on the map. It empties into Mark West Creek, a tributary of the Russian River. The Laguna de Santa Rosa is accompanied in its course by a series of marshy



areas. Because the section of the stream covered by the present study is about 12 miles long, the different locations along it have been specified more exactly, such as Laguna de Santa Rosa near Trenton, northeast of Graton, north of Sebastopol, east of Sebastopol, east of Cunningham, etc.

Bennett Mountain Lake (23). Shallow lake with marshy shores located 3 miles airline west of Kenwood in a flat on the eastern slope of Bennett Mtn. at 1180 feet elevation. It is accessible from Lawndale (about 2 miles west of Kenwood) on a trail 2 miles long up the hill.

Kenwood Marsh (24). At Kenwood 0.3 mile west of Highway 12.

Following are some noteworthy plant records.

SPARGANIUM MULTIPEDUNCULATUM (Morong) Rydberg. (*S. simplex* in Mason, 1957.) This northern bur-reed has been reported for Sonoma County only from one locality, the Pitkin Marsh, which represents the southernmost known station for this plant in the Coast Ranges (Rubtsoff, 1953). Later it was found growing also at the two following locations in Sonoma County, at about the same geographical latitude as the Pitkin Marsh. In the Guerneville Marsh it grows in a limited area in shallow water of a streamlet (Rubtsoff 1586 and 1587, in 1954); in the Duncans Mills Marsh it covers extensive areas of shallow water along the margins of a large pond (Rubtsoff 2041, in 1955).

POTAMOGETON DIVERSIFOLIUS Rafinesque-Schmaltz. This pondweed has been found in 1955 in the Bennett Mtn. Lake, Sonoma County, growing in water near the margin of the lake (Rubtsoff 1970). Previously, it has been reported outside of the Central Valley only from Modoc County, Boggs Lake in Lake County (Mason, 1957), and Lake Surprise in San Jacinto Mts. (Munz, 1935; Munz and Keck, 1959).

POTAMOGETON RICHARDSONII (Bennett) Rydberg. This species, not previously reported from the Coast Ranges south of Humboldt County (Munz and Keck, 1959), was collected in 1951 and 1952 in the northern lake of Blue Lakes in Lake County (Rubtsoff 694, 1272).

POTAMOGETON CRISPUS L. A fragment of a plant was collected in 1956 in an artificial pond in the Atascadero Creek Marsh, Sonoma County (Rubtsoff 2909). This species, known in California from the Santa Ana River in southern California, the Central Valley, and the San Francisco Bay region (Mason, 1957, Munz, 1935, Munz and Keck, 1959), seems not to have been previously reported from the outer Coast Ranges north of the Golden Gate.

NAJAS GUADALUPENSIS (Sprengel) Magnus. This species of naiad, previously reported in the California Coast Ranges as far north as Marin County (Howell, 1949; Mason, 1957, has been collected in 1955 in Sonoma County, where it grows abundantly in the Bennett Mtn. Lake (Rubtsoff 1996).

SAGITTARIA CUNEATA Sheldon. As has been noted recently in anticipation of the publication of this note, *S. cuneata* is to be included in the flora of Marin County (Howell, 1959, p. 66). The specimens on which the record of *S. latifolia* Willd. was based for Chileno Valley in Marin County (Howell, 1949), are actually *S. cuneata*. The other locality given in Howell (1949) for *S. latifolia* is Santa Venetia, but no specimen can be found in the herbarium of the California Academy of Sciences to substantiate this record. Thus, although *S. cuneata* Sheldon (*S. arifolia* Nutt.) is to be included in the Marin County flora, *S. latifolia* should not be excluded, because the plants at Santa Venetia may have been this latter species.

Laguna in Chileno Valley, the station for *S. cuneata* in Marin County, is located at the northern boundary of the county, near the Sonoma County line, at about 220 feet above sea level. When Mr. Howell collected his specimens in 1946 and 1947, the area was undisturbed. Upon recent checking (1959), the plants appeared to be numerous there on narrow strips of ground along fences which escape ploughing and are covered with marsh vegetation, the area in general being now under cultivation.

The low altitude of the area is of particular interest, because, according to Mason (1957), *S. cuneata* is not known from low altitudes in California, being confined to middle and high altitudes. In this connection it may be interesting to list the specimens known to the writer from the North Coast Ranges, along with altitudes of the stations. For this purpose approximate elevations have been taken from topographic maps of the U. S. Geological Survey or of the Corps of Army Engineers.

HUMBOLDT COUNTY: pond near Harley place, Orleans region, 350 ft., Pollard in 1945 and 1946. LAKE COUNTY: Kelseyville, along lower Cold Creek, 1350 ft., Blankinship in 1927; Boggs Lake, 2750 ft., Baker 11095 in 1945, Rubtsoff 2824 in 1956, 3451 in 1957. SONOMA COUNTY: Bennett Mtn. Lake, 1180 ft., Rubtsoff 1965, 1993, 2101 in 1955; small pool on Russian River bottom near East Guerneville, near Guerneville, 25 ft., Rubtsoff 2167 in 1955 (the identity of this specimen is not certain because it is in leaf only; no fruiting material could be collected at a later date because the

station was destroyed when the area was converted into a public beach; the leaves and the size of plant are as in typical *S. cuneata*). MARIN COUNTY: Laguna in Chileno Valley, 220 ft., *Howell* 22030 in 1946, 23261 in 1947, *Rubtzoff* 4191, 4204 in 1959.

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NOTES ON THE PLANTS OF THE 1955 REFUGIO PASS BURN, SANTA BARBARA COUNTY, CALIFORNIA

BY PETER H. RAVEN

University of California, Los Angeles

The extensive fire which ravaged 75,690 acres of the Santa Ynez Mountains above Santa Barbara from September 6 to 15, 1955, prepared suitable germination conditions for many of our rarest native plants and cleared away the brush surrounding others which had been earlier overlooked. Mr. Henry M. Pollard, an indefatigable collector of Santa Barbara who has given many hundreds of critical and interesting specimens from the Santa Barbara region and other parts of California to the herbarium of the California Academy of Sciences, collected the specimens upon which the following report is based. These collections were made on field trips to the burned area from March to June in 1956 with Mr. Clifton F. Smith who also collected these unusual plants. The first set of the Pollard specimens is deposited in the Academy herbarium; large sets of duplicates are in the United States National Herbarium, in the herbarium of the Rancho Santa Ana Botanic Garden, and elsewhere.

It is not the intent of this paper to present a complete sum-

mary of the vegetation on the burned area, nor to give an account of the appearance and plant associations found there,¹ but rather to record some of the more significant collections so that the distributional records may be made available.

When viewed in the spring of 1956, the burned area in places was a flower garden dominated by luxuriant masses of such species as *Phacelia grandiflora* (Benth.) Gray and *Dicentra ochroleuca* Engelm., which, together with others, made spectacular displays in several localities. Grasses, principally *Lolium multiflorum* Lam. and *Bromus mollis* L., broadcast from airplanes by the U.S. Forest Service in an attempt to control erosion, were prominent over most of the burn and probably prevented some of the native species from becoming as abundant as they might have otherwise.

This planting explains the appearance on the burn of other non-native species, heretofore unknown in the region. Some of these are summarized as follows:

CYNOSURUS ECHINATUS L. Two plants found, Camino Cielo, Santa Ynez Range summit above Tecalote Canyon, at about 2700 feet elevation, June 22. Becoming increasingly widespread in the State, growing in shaded areas.

TRIFOLIUM HIRTUM All. Ridge west of San Pedro Canyon, at about 1000 feet elevation, May 3; Cañada del Venadito, the next canyon east of Refugio Pass, April 22. First reported from California by Raven (Leaf. West. Bot. 7:151, —1954) on the basis of a collection from Butte County. In addition to these specimens, the following are in the herbarium of the California Academy of Sciences: 3 miles northeast of Raymond, Madera County, *Howell & Barneby 29438* (one plant); burn in chaparral and oak woodland, 2 miles from San Antonio Mission on Del Venturi Road to Memorial Park, Monterey County, *Howell 30617*. This species was listed by the Forest Service as a component in the seed mix that was sown on the Refugio Pass burn, and has probably been sown elsewhere in the State in a similar manner.²

TRIFOLIUM INCARNATUM L. Cañada del Venadito, April 22. Often sown on burns, as in the central Sierra Nevada foothills, and gradually becoming fairly common along roadsides. (See Leaf. West. Bot. 8:144, —1957.)

¹ An interesting general account has been given by Clifton F. Smith, "Botanizing on the burn," Museum Talk 31:33-39, —1956 (publication of the Santa Barbara Museum of Natural History).

² In November, 1958, Mr. Pollard made another collection of this clover in Santa Barbara

GALIAM PARISIENSE L. Along Camino Cielo about 2 miles west of San Marcos Pass, at about 2200 feet elevation, June 22. Spreading in southern California.

The following native species of special interest were found by Mr. Pollard:

SCRIBNERIA BOLANDERI (Thurb.) Hack. Collected in local depressions along Camino Cielo, where it grew associated with such plants as *Juncus bufonius*, *J. Kelloggii*, *J. sphaerocarpus*, *Trifolium microcephalum*, *Mimulus floribundus*, *Heterocodon rariflorum*, and *Gnaphalium palustre*: between Camp Goddard and Brush Peak, elevation about 2700 feet, May 16 and 23; east of Radio Peak, at about 3000 feet elevation, May 23; about one mile west of San Marcos Pass, at 2200 feet elevation, May 16. According to Beecher Crampton (Leafl. West. Bot. 7:219-220, -1955), these seem to represent the first collections of this often inconspicuous grass from south of San Luis Obispo County.

JUNCUS KELLOGGII Engelm. Found associated with the preceding species on Camino Cielo: between Camp Goddard and Brush Peak, at about 2700 feet elevation, May 23; east of Radio Peak at about 3000 feet elevation, May 23; about 3 miles west of San Marcos Pass, at about 2500 feet elevation, June 22. These localities serve to connect those in San Luis Obispo County with those in the San Bernardino Mountains (see Hermann, F. J., Leafl. West. Bot. 5:114-116, -1948).

JUNCUS SPHAEROCARPUS Nees. Wet places and rivulets, often together with the preceding two species and their associates on Camino Cielo: summit of Santa Ynez Range about 3 miles west of San Marcos Pass, at about 2500 feet elevation, June 22; east of Radio Peak, at about 3000 feet elevation, May 23; between Camp Goddard and Brush Peak, at about 2700 feet elevation, May 23. (For additional stations for a plant which is generally rare in the south Coast Ranges see: Howell, J. T., Marin Flora, p. 99, -1949; Sharsmith, H. K., Amer. Midl. Nat. 34:331, -1945.)

County, this time from coastal mesas near Santa Barbara. Concerning this collection Mr. Pollard writes as follows:

"The locality where I collected *Trifolium hirtum* lies in a stretch of calcareous and sandy tableland (1½ by ½ mile) bounded by Hope Ranch, Atascadero Creek, and the ocean bluffs—part of the old More Ranch, now being cut up for subdivision settlement. The land has been fallow I would say for several years and its deeper soils are now blanketed with a heavy cover of lodged Italian rye, with some *Phalaris tuberosa* and *Festuca arundinacea* in the low spots. There is an immense amount of the clover, widely scattered over this area. It is gregarious in places where the soil is thin or well drained; large patches of the hairy white heads, visible at a distance, form part of the surface color pattern. My first thought on seeing these was that here was a well-established foreign clover, introduced years before with forage grasses. . . ."

POLYCARPON DEPRESSUM Nutt. Vicinity of Slippery Rock Ledge, at about 1500 feet elevation, above Goleta, March 18 and 22.

PHACELIA GRISEA Gray. Camino Cielo 6 to 7 miles west of San Marcos Pass, at about 2700 feet elevation, May 23; 2 to 3 miles east of Radio Peak, elevation 2700 to 3000 feet, June 22. Remarkable range extension for a plant formerly regarded as an endemic of the Santa Lucia Mountains of Monterey and San Luis Obispo counties (*see* Jepson, W. L., *Flora of California*, vol. 3, p. 273, —1943; Howell, J. T., *Amer. Midl. Nat.* 33:491–2, —1945).

EVAX SPARSIFLORA (Gray) Jeps. var. *BREVIFOLIA* (Gray) Jeps. Camino Cielo, about 1 mile west of San Marcos Pass, at about 2200 feet elevation, May 16; about 2 miles west, at about 2500 feet elevation, April 25. Intermediate between the San Luis Obispo County and San Diego localities of Munz (*Calif. Fl.*, p. 1266,—1959).

SENECIO ASTEPHANUS Greene. Young pine plantation, on Camino Cielo about 3 miles east of Radio Peak, at about 3000 feet elevation, May 16 and 23, June 22. An additional locality for a rare plant previously known only from the San Gabriel Mountains, Tehachapi Mountains, and mountains of San Luis Obispo County (Munz, *Man. So. Calif. Bot.*, p. 580,—1935).

A MEXICAN POKEBERRY IN SAN FRANCISCO, CALIFORNIA

BY JOHN THOMAS HOWELL

Scarcely had I moved into my office in the new botanical quarters of the California Academy of Sciences in Golden Gate Park on June 25, 1959, when I detected numerous seedlings of an unknown weed just outside my window. Here they grew on the freshly graded ground about the building amid an adventitious profusion of young pigweeds, knotweeds, and horseweeds, of spurreys, nightshades, and others that rank high in the affections of a weed-loving botanist. Although I knew nothing of the seedling appearance of a pokeberry, I early suspected that that might be what the unknown was—and that is what it proved to be, when precociously enough, the first raceme appeared about a month later.

Meanwhile in another part of San Francisco that was also undergoing terrane-disturbing change, my friend, Malcolm G. Smith, was making his own observations on a plant of *Phytolacca*. This was growing in a district that had been cleared of old frame houses to make way for a modern "urban renewal" project. Mr. Smith, intrigued by his pokeberry and noting that it was not included in the "Flora of San Francisco," called my attention to his discovery, which I visited immediately, since I, too, was decidedly pokeberry-minded. The plant was in flower and fruit, about 7 feet tall, rankly branched and herbaceous above a soft-woody base and trunk. Examination of the flowers disclosed that this plant, growing in waste ground on Geary Street between Gough and Franklin streets, was the same as the seedlings in Golden Gate Park. Spurred by this discovery, I sought out several other occurrences of pokeberry in Golden Gate Park in the vicinity of the Academy buildings; and in the Academy herbarium I found three further collections of the same plant from San Francisco gardens. Since neither these nor my collections could be readily identified among more commonly cultivated species of *Phytolacca*, the search was on for a name for the San Francisco pokeberry.

Our plant could not be *Phytolacca americana* L., the species reported for California (Weeds of Calif., p. 165; Calif. Flora, p. 388); and, since it was not taken care of in floras of eastern United States, I turned to Hans Walter's 1909 monograph of the *Phytolaccaceae* in *Das Pflanzenreich* (IV.83:1-154). Here, because of the slight but obvious size-differences in the inner and outer sepals of each flower, the plant keyed out directly and easily to *P. heterotepala* H. Walter (p. 51), seemingly a rather rare and local Mexican species. If, however, one by-passed the heterotepaly and proceeded down the rest of the key, the plant would agree with *P. icosandra* L. (p. 60), a common widespread species of the warmer parts of the New World.

Certainly *P. heterotepala* and *P. icosandra* seemed more closely related than one would judge from their relatively wide separation by Walter in his monograph. Since there was no material of *P. heterotepala* in the Academy herbarium, I borrowed the two specimens of the species in the U.S. National Herbarium for comparison with our San Francisco plants and with specimens of *P. icosandra* in the Academy herbarium. From these studies, I have concluded that our San Francisco

plant is the rarely detected Mexican species *P. heterotepala*, a species, however, that is relatively closely related to *P. icosandra*. Two pictures of "*P. icosandra*" in Curtis' Botanical Magazine are quite unlike: pl. 2633 could well depict *P. heterotepala* (although Walter cites it under *P. icosandra*), whereas pl. 4967 is *P. icosandra* as I understand it.

The following notes have been taken from our San Francisco plants:

Plants precocious, first blooming when only 3 or 4 months old and less than 1 ft. tall, becoming rank herbs and attaining a height of 7 to 8 ft. in about 6 months, duration of plant not known but appearing to be more than a strict annual; stems stout, green; leaves glabrous, succulent, without a noticeable odor; inflorescences (raceme-like panicles) long and rather laxly flowered, up to 25 cm. long, bracts longer than the usually 1-flowered "pedicels," "pedicels" 2-5 mm. long, bearing 2 (or 1 to several) bractlets, these usually less than 1 mm. long, "pedicels" and rachis of "raceme" scurfy- and papillate-pubescent; sepals 5, about 3 mm. long, the 2 outer narrower and about 1.5 mm. wide, the 3 inner broader and over 2 mm. wide, or the sepals sometimes seemingly 6-8 (in which case the outermost "sepals" may be bractlets having the texture and appearance of sepals), the larger sepals greenish with rosy-purplish-tinged margins, in winter the sepals, "pedicels," and swollen hypogynous disk sometimes becoming cerise-tinted; stamens in several series, 17-20; carpels 9-11; fruit black-purple; seed 2.5 mm. long.

San Francisco collections: Western Nursery (of Charles Abraham, at Franklin and Greenwich streets), *Eastwood*, Oct., 1915; garden of Swedenborgian Church, Lyon and Washington streets, *Alice B. Wright*, in 1943; garden on Pierce Street between Green and Vallejo streets (plant said to volunteer), *Mrs. Leon Jones*, Aug., 1955; waste ground along sidewalk, Geary Street between Franklin and Gough streets, *Howell 34602*, Aug. 28, 1959; Golden Gate Park near tennis courts (plants spontaneous), *Howell 34604*, Sept. 1, 1959; disturbed ground adjacent to Academy's new botanical quarters (seedlings 3 to 5 months old), *Howell 35095*, Oct. 2, 1959; "old plant" (perhaps over 1 year old) at southeast corner of Steinhart Aquarium (showing winter coloration), *Howell 35121*, Jan. 23, 1960; inflorescences (up to 25 cm. long, some markedly paniculate) from rank plant 6.5 ft. tall about 8 or 9 months old at south entrance to botanical quarters, *Howell 35122*, Jan. 23, 1960.

Although Walter characterized *P. heterotepala* as *frutex* (p. 51), Standley (Contrib. U. S. Nat. Herb. 23:263,—1922) did not treat it, remarking: "It may be that some Mexican species of *Phytolacca* become shrubs, but the writer has seen no conclusive evidence to this effect." The duration of the San Francisco plant will be watched with interest, if only in its half-weedy occurrence it may be allowed to attain senility.

PAPPUS DIMORPHISM IN *CROCIDIUM*
MULTICAULE HOOK.

BY ROBERT ORNDUFF

University of California, Berkeley

The genus *Crocidium* (*Compositae-Senecioneae*) is normally interpreted as consisting of a single, annual species which ranges from Vancouver Island to central California. In many areas of the Pacific Northwest it occurs in large colonies which give much the same aspect to the landscape as do species of *Baeria* and other annual *Helenieae* in southern Oregon and California. The ray-florets of *Crocidium* may or may not possess a pappus, and in 1928 St. John proposed the name *C. pugetense* to include those plants with epappose rays (Torreya 28:74). However, as Cronquist has pointed out (Vascular Plants of the Pacific Northwest 5:157,—1955), *C. multicaule* was described and figured by Hooker as having epappose rays, whereas the isotype material examined by St. John was pappiferous. Consequently, the names *C. multicaule* and *C. pugetense* must be considered synonymous and both refer to the phase with epappose rays. Furthermore, Cronquist felt that a taxonomic segregation was not desirable since both forms may occur in the same population.

However, in view of the paucity of good taxonomic characters in many *Compositae* and the known sympatric occurrence of closely related species in the family, I was stimulated to investigate the distribution of these two phases. Naturally occurring populations, all of which were dimorphic, have been investigated in the field in Oregon and Washington. Progenies from collections in these states and California have been grown in cultivation for three seasons beginning in 1957. Observations made both in the greenhouse and the wild show that these two phases freely cross, produce fertile offspring, and are both components of the same interbreeding population.

All of the herbarium specimens (43 collections) at the University of California herbarium, Berkeley, have been examined. Because of the small number of samples in each collection it was not possible to determine whether any populations are composed exclusively of one phase or the other. But more important in terms of this discussion, it is clear that populations contain-

ing both phases do occur nearly throughout the range of *Crocidium*, the possible exception being collections from the central Sierra Nevada foothills in which no epappose plants have been seen. These populations occur at the southeastern limit of distribution of the species. The evidence at hand suggests further investigation along genetic lines, but leads me to conclude that it is not desirable to recognize plants with pappose rays and plants with epappose rays as different taxonomic entities.

ADDITIONS TO THE FLORA OF NEW MEXICO

BY R. C. JACKSON

University of Kansas, Lawrence

The following species are reported as new additions to the New Mexico flora. A number of the species represent range extensions of native southwestern species while others are probably garden escapes recently introduced in the state. All specimens cited below are deposited in the University of New Mexico Herbarium.

NYMPHAEA POLYSEPALA (Engelm.) Greene. About 5 miles east of Cumbres Pass, Rio Arriba County, May 11, 1958, *Abeyta 14*.

AMOREUXIA PALMATIFIDA Moç. & Sessé. Rocky hillside at Winkelman's Well on the east slopes of the Little Hatchet Mts., Grant County, August 20, 1955, *Castetter 10346*.

LITHOSPERMUM CAROLINIENSE (Walt.) MacMill. Bandelier National Monument at a small mesa-top ruin, Sandoval County, September 3, 1957, *Yarnell 155*.

ARTEMISIA PARRYI Gray. Growing on a ledge in Costilla Canyon, Colfax County, July 18, 1953, *Castetter 7727*.

CARTHAMUS TINCTORIUS L. Cultivated ground along the Rio Grande River, Bernalillo County, July 20, 1931, *Castetter 8049*.

CENTAUREA REPENS L. Albuquerque Mesa, Bernalillo County, June 5, 1950, *Castetter 9397*; roadside at Plaza Larga Creek, Quay County, May 18, 1943, *Hershey*; roadside near Tularosa, Otero County, May 23, 1952, *Castetter 9373*; roadside near Santa Fe, Santa Fe County, July 12, 1952, *Castetter 9467*.

COREOPSIS ATKINSONIANA Dougl. Moist meadow in canyon just northeast of Ramah, McKinley County, August 6, 1954, *Castetter 9343*.

COREOPSIS GRANDIFLORA Hogg ex Sweet. Between Cloudcroft and Mescalero, Otero County, July 4, 1949, *Castetter 8722*.

ERIGERON COMPOSITUS Pursh. Top of Owyhee Mts. near Silver City, Grant County, June 20, 1937, *Platt 12*.

PECTIS LONGIPES Gray. Along canyon floor just west of San Luis Pass, Hidalgo County, May 11, 1957, *Jackson 2046*.

PINAROPAPPUS ROSEUS Less. Carlsbad Caverns National Park, Walnut Canyon, Eddy County, May 8, 1954, *Prasil & Wells*; Slaughter Canyon in the Guadalupe Mts., Eddy County, May 19, 1951, *Dittmer 8774*.

POROPHYLLUM GRACILE Benth. Apache Hills, rocky ridge among ocotillo and agave, Hidalgo County, May 11, 1957, *Jackson 2368*.

AN ANDEAN AND A CALIFORNIAN SEDGE IN ARIZONA

BY F. J. HERMANN
Beltsville, Maryland

Among a set of sedges collected by Mr. C. P. Pase in the Tonto National Forest, Gila County, Arizona, and submitted by the U. S. Forest Service to the writer for determination were two additions to the known flora of Arizona, one of which is also new to the United States. Both of these *Carices* were found by Mr. Pase at the same site on May 27, 1958: "Turbinella oak chaparral, on coarse granitic soil, alt. 3600 ft., Rock Creek, Three Bar Game Management Area."

Carex Bonplandii Kunth, a species belonging to Section *Ovales*, is common in the Andes of Colombia, Peru and Ecuador. It extends southward into Bolivia and is known also from high mountains in Costa Rica and Vera Cruz. Its discovery in central Arizona (*C.P. Pase 946*) represents a northwestward extension in range of approximately 1300 miles.

The marginal wings of the perigynium in *Carex Bonplandii* are so nearly obsolete that the plant would easily key out to Sections *Stellulatae* or *Deweyanae* in most keys, but the perigynia lack the spongy tissue that is so pronounced in those of

species belonging to these allied sections and the whole aspect of the plant is definitely that of the *Ovales*. South American material of *C. Bonplandii* has the margins of perigynia uniformly thickened,—a conspicuous characteristic mentioned by neither Kükenthal nor Mackenzie. In this respect alone the Arizona plant is atypical, but many of its perigynia show a partial marginal thickening either near the base or toward the middle of the body.

Carex serratodens W. Boott (*C. bifida* Boott), of Section *Atratae*, is centered in the Coast Ranges of California from San Luis Obispo County to Humboldt County, along the northerly foothills of the Sierra Nevada and in Ventura, Kern and San Bernardino counties in California, and in Jackson County, in southernmost Oregon. The Arizona collection (*C.P. Pase 947*) extends the known range of the species eastward about 400 miles.

Specimens of both collections are in the herbaria of the University of Arizona, the U. S. Forest Service, the U. S. National Museum, the California Academy of Sciences, and that of the writer.

Crops Research Division, A.R.S.
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Beltsville, Maryland

NOTES ON THE FLORA OF ARIZONA II

BY CHARLES T. MASON, JR.

Four species new to the recorded flora of Arizona have been collected and sent to the University of Arizona herbarium for determination. One represents a new generic record and only one is an introduced weed.

CYPERUS STRIGOSUS L. (*Cyperaceae*) was first recorded for the state as the result of a collection made by L. N. Goodding in 1958 at Sabino Canyon, Santa Catalina Mountains, Pima County. The area of the collection is a popular spot for many tourists; and also, it is an artificial lake which attracts many birds, consequently there are abundant opportunities for the introduction of the seeds.

LEMNA AEQUINOCTIALIS Welwitsch (*Lemnaceae*) was noted as a representative of the Arizona flora by M. L. Giardelli (*Lemna aequinoctialis* Welwitsch nueva para la flora de America y de las islas Filipinas. Darwiniana 114:584-590,—1959), who cites L. N. Goodding's collection #12-45 from El Hambra Charco, Papago Indian Reservation, Pima County, as the only collection of this species in the United States.

BRASSICA TOURNEFORTII Gouan (*Cruciferae*), an Eurasian weed, has become established in the Yuma area. It was collected twice by K. C. Hamilton, weed specialist at the University of Arizona, who reported it well established along the highway and covering several hundred acres of citrus groves. This weed was probably introduced as a contaminant in Hubam Clover seed to which much of the area had been planted. Robbins, Bellue, and Ball (Weeds of California, p. 216,—1951) report such a contamination in the Imperial Valley Hubam Clover crop of 1947.

SYMPETELIA RUPESTRIS (Baillon) Gray (*Loasaceae*) was collected at Cabeza Prieta Tanks on the Cabeza Prieta Game Range, Yuma County, by Gale Monson. This Mexican plant, previously reported from Sonora and Baja California, represents a new generic record for Arizona.

Representatives of all these collections are on file in the Herbarium of the University of Arizona.

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ALPHABETICAL LIST OF FAMILIES FOR MUNZ AND KECK

An alphabetical list of families, with page on which each family begins, is available for Munz and Keck, *A California Flora*, and can be pasted inside the back cover. Copies may be had by sending a request as to number wanted together with a self-addressed stamped envelope to Rancho Santa Ana Botanic Garden, 1500 North College Avenue, Claremont, California.

LEAFLETS *of* WESTERN BOTANY

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SAN FRANCISCO, CALIFORNIA

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NEW AND CRITICAL ARIZONA ASTRAGALI

BY R. C. BARNEBY

New York Botanical Garden

While preparing an account of *Astragalus* for the projected Supplement to Kearney & Peebles' Arizona Flora I have found the following minor novelties in need of formal publication. Arguments in favor of the two combinations in the critical section *Scytocarpus* will be presented in a revision of their group.

Astragalus amphioxys Gray var. *modestus* Barneby, var. nov., ab aliis speciei formis floribus parvulis (calyce 6.3–9.3 mm., vexillo 13–16 mm., carina 11–12.7 mm. tantum longis) recognita.

ARIZONA: e. side of Vulcan's Throne, Toroweap Valley, Grand Canyon National Monument, Mohave County, about 4500 ft., April 23, 1952, *Elizabeth McClintock* 52–193. Holotype, CAS! Isotypes, NY, RSA!

The range of var. *modestus*, distinguished from the sympatric var. *amphioxys* (with banner mostly 18–28 mm. long) by its notably small corollas, lies within the drainage of the Colorado River below the Grand Canyon, where it is recorded as locally plentiful at about 4200 to 4600 feet, both on limestone and volcanic bedrock, from several stations in northern Mohave County, Arizona, and Lincoln County, Nevada. Young flowering specimens of var. *modestus* from Mokiak Pass (*Ripley & Barneby* 4321) have been misidentified in the past as the related *A. musimonum* Barneby, in which the flower is even further shortened so that the calyx-tube becomes campanulate and the petals, as seen in profile, appear quite differently proportioned. The latter is known at present only from Clark County, Nevada, but is to be sought in northwestern Arizona.

Astragalus fucatus Barneby, spec. nov., diu botanicis sub nomine erroneo "*A. subcinereo*" cognita et ideo nunquam hucusque descripta, *A. subcinereo* Gray vero affinis sed pube arcte appressa, petalis saturatius purpureis, carinae apice angustius triangulari subrostriformi, legumine plerumque latius inflato, ovulisque magis numerosis (21–32, nec 10–20) distincta.

ARIZONA: near Hotevilla, Navajo County, 6200 ft., June 8, 1937, *Peebles* 11392. Holotype, CAS! Isotype (from "5 miles w. of Oraibi"), NY!

The *Astragalus* described above is new in name only, being the same as that treated as *A. subcinereus* by Jones (Rev. Astrag. 106,—1923) and as *Phaca subcinerea* by Rydberg (in N. Amer. Fl. 24:351,—1929), but not the original *A. subcinereus* Gray (1878) of which the type belongs to a related species known until the present under the name *A. Sileranus* Jones. Although simi-

lar in habit of growth and in the small purplish flowers giving rise to inflated, unilocular pods, the two species are morphologically and geographically disjunct, as shown in the following contrasts:

1. Calyces and stems silvery-canescant with straight, appressed hairs; pod appressed-strigulose, 1.2-2.2 cm. in diameter; keel-blades contracted distally into a triangular, beak-like apex; ovules 21-32; high sandy deserts of northeastern Arizona and southeastern Utah drained by the San Juan and Little Colorado rivers, on sandstone bedrock, its western known limit in extreme eastern Coconino County, Arizona.
.....*A. fucatus*
1. Calyces and stems villosulous or loosely strigulose with sinuously incurved, horizontally spreading, or sometimes retrorse hairs; pod loosely strigulose, 6-13 mm. in diameter; keel-blades rather sharply deltoid but not beak-like at apex; ovules 10-20; northwestern Arizona, southwestern Utah, and southeastern Nevada, in pinyon-juniper and pine forests, nearly always on limestone, its eastern known limit on the Kaibab Plateau, Arizona.....*A. subcinereus*

It may be worth noting that the type-station of *A. subcinereus* Gray (non auct.) is at Mokiak Pass, Mohave County, Arizona, far west of the known range of *A. fucatus* to which the name has traditionally been applied.

Astragalus praelongus Sheld. var. *lonchopus* Barneby, var. nov., a var. *praelongo* (et affinis omnibus) legumine anguste oblongo-ellipsoideo vel fusiformi basi in stipitem validum elongatum 4.5-8 mm. longum tubo calycino subaequilongum contracto absimilis.

ARIZONA: Rattlesnake Mines, Carrizo Mountains, Apache County, June 9, 1949, the collector not recorded, distributed as *U. S. Geological Survey No. 511*. Holotype, CAS!

The range of var. *lonchopus*, of which I have seen eleven collections, extends over the high sandstone country of northeastern Arizona and adjacent Utah from near the "Four Corners" west through Monument Valley nearly to the Colorado River, a distance of about ninety miles, and north in Utah as far as the Natural Bridges. In this area it apparently displaces other forms of its polymorphic species. The substance of var. *lonchopus* has been familiar to students of *Astragalus* for many years, for it is in great part the *Jonesiella arcta* of Rydberg, the *Astragalus arctus* of Tidestrom's Flora of Utah and Nevada, and the *A. Preussii* var. *latus* of Arizona Flora. The type of *A. Preussii* var. *latus* Jones, the basonym upon which ultimately rest *A. Presussii* var. *arctus* Sheld. and its derived synonyms, represents a form of genuine *A. Preussii* distinguished from *A. praelongus* sens.

lat. in its permanently ascending, bright purple flowers, narrow, red (not broadly campanulate, whitish) calyx-tube, and truly unilocular pod of thinner texture.

NEW COMBINATIONS

Astragalus flexuosus Dougl. var. *Greenei* (Gray) Barneby, comb. nov. *A. Greenei* Gray, Proc. Amer. Acad. 16: 105 (1880). *A. gracilentus* var. *Greenei* (Gray) Jones, 1898 (= *Phaca gracilenta* Gray, 1849. *A. gracilentus* Gray, 1864).

Astragalus Hallii Gray var. *fallax* (Wats.) Barneby, comb. nov. *A. fallax* Wats., Proc. Amer. Acad. 20: 362 (1885) (non Fisch., 1853). *A. famelicus* Sheld., 1894. *A. gracilentus* var. *fallax* (Wats.) Jones, 1898.

A NEW COMBINATION IN DODECATHEON (PRIMULACEAE)

BY HENRY J. THOMPSON

University of California, Los Angeles

At the time of writing my monograph of *Dodecatheon* (The biosystematics of *Dodecatheon*. Contr. Dudley Herb. 4: 73—154,—1953), I was not aware of the name *Exinia pulchella* Rafinesque and the combination *D. pulchellum* (Raf.) Merrill. Merrill's combination must replace *D. radiculatum* as used in my monograph. The relationship of these names and the pertinent references are indicated in the following partial synonymy.

DODECATHEON PULCHELLUM (Raf.) Merrill,

Journ. Arn. Arb. 29:212 (1948)

DODECATHEON PULCHELLUM (Raf.) Merrill subsp. PULCHELLUM

Exinia pulchella Raf., Aut. Bot. 185 (1840).

D. pauciflorum Greene, Pittonia 2:72 (1890).

D. radiculatum Greene, Erythea 3:37 (1895).

DODECATHEON PULCHELLUM (Raf.) Merrill subsp. MONANTHUM (Greene)

H. J. Thompson ex Munz, Aliso 4:96 (1958).

D. pauciflorum Greene var. *monanthum* Greene, Pittonia 2:73 (1890).

D. radiculatum Greene subsp. *monanthum* (Greene) H. J. Thompson, Contr. Dudley Herb. 4:146 (1953).

Dodecatheon pulchellum (Raf.) Merrill subsp. *Watsonii* (Tidestrom) H. J. Thompson, comb. nov.

D. Watsonii Tidestrom, Proc. Biol. Sci. Wash. 36:183 (1923).

D. radiculatum Greene subsp. *Watsonii* (Tidestrom) H. J. Thompson, Contr. Dudley Herb. 4:147 (1953).

D. pauciflorum Greene var. *Watsonii* (Tidestrom) C. L. Hitchc., Vascular Plants Pac. N. W. 4:45 (1959).

TWO SPECIES OF HYMENOXYS (COMPOSITAE) NEW FOR ARIZONA

BY KITTIE F. PARKER

George Washington University, Washington, D.C.

1. *Hymenoxys Ivesiana* (Greene) K. F. Parker, comb. nov. *Tetraneuris Ivesiana* Greene, Pittonia 3:269 (1898); *Tetraneuris mancosensis* A. Nels., Bot. Gaz. 28:129 (1899); *Tetraneuris intermedia* Greene, Pl. Baker. 3:29 (1901); *Actinea leptoclada* (A. Gray) Kuntze var. *Ivesiana* Macbr., Contr. Gray Herb. II, 56:44 (1918); *Tetraneuris pilosa* ex Rydb., Fl. Colo. 379 (1906); *Hymenoxys acaulis* (Pursh) K. F. Parker var. *Ivesiana* (Greene) K. F. Parker, Madroño 10:159 (1950).

Cespitose perennial 15–35 cm. high, with a multicapital caudex; stems simple or few-branched; leaves in basal tufts, 2–10 (rarely 12) cm. long, 1–6 mm. broad, and sparingly cauline at least below; heads solitary or 1–3 on each stem, 8–20 mm. in diameter (without rays), densely to sparingly villous; pappus-scales 5–7, mostly 3.5–4 (2.5–5) mm. long, acuminate or awned.—Same range in Arizona as *H. acaulis* var. *arizonica* (Greene) K. F. Parker. Flowering principally in June. Colorado, New Mexico, Utah, and north-central Arizona.

This plant was included as a variety of *Actinea leptoclada* (A. Gray) Kuntze in "Flowering Plants and Ferns of Arizona,"¹ and of *H. acaulis* (Pursh) K. F. Parker in "Arizona Flora"² and "Plants of Colorado."³ It was treated as a variety of *H. acaulis*^{3, 4} because many populations appear to be intermediates between *H. Ivesiana* and *H. acaulis* var. *arizonica*. Typically *H. Ivesiana* is distinct, with the stems usually few-branched and bearing 1 to 6 reduced leaves, whereas *H. acaulis* var. *arizonica* is strictly scapose with the leaves all basal. However, since the stems of *H. Ivesiana* are often unbranched with only a single leaf or occasionally entirely leafless, while many plants of *H. acaulis* var. *arizonica* bear 1 or 2 leaves on the scapes, the two taxa apparently merge and many populations seem indistinguishable.

As a result of chromosome counts by Speese and Baldwin,⁵ a very interesting situation came to light, indicating that such populations are actually separable and that probably most of them are *H. acaulis* var. *arizonica*. *Hymenoxys acaulis* var.

1 Blake, S. F., in Flowering Plants and Ferns of Arizona, T. H. Kearney, R. H. Peebles, and collaborators. 983–987 (1942). U.S. Government Printing Office, Washington, D.C.

2 Blake, S. F., in Arizona Flora, T. H. Kearney, R. H. Peebles, and collaborators. 925–928 (1951). University of California Press, Berkeley and Los Angeles.

3 Parker, K. F., in Manual of the Plants of Colorado, H. D. Harrington. 591–594 (1954). Sage Books, Denver, Colorado.

4 Parker, K. F. New combinations in *Hymenoxys*. Madroño 10:159 (1950).

5 Speese, Bernice M., and Baldwin, Jr., J. T. Chromosomes of *Hymenoxys*. Amer. Jour. Bot. 39:685–688 (1952).

acaulis and *H. acaulis* var. *arizonica* [also another variety, *H. acaulis* var. *caespitosa* (A. Nels.) K. F. Parker] are tetraploid, $2n = 60$, while *H. Ivesiana* is diploid, $2n = 30$. In addition to the chromosome evidence, *H. Ivesiana* is more logically treated as distinct from *H. acaulis* because of its branching stems and cauline leaves. These are basic characters in the genus *Hymenoxys*.

2. *HYMENOXYS HELENIOIDES* (Rydb.) Cockerell, Bull. Torrey Club 31:481 (1904). *Picradenia helenioides* Rydb., Bull. Torrey Club 28:21 (1901); *Dugaldea helenioides* A. Nels., Man. Rocky Mts. 562 (1909); *Actinea helenioides* Blake, Jour. Wash. Acad. 21:335 (1931).

Perennial 25–50 cm. high, from a taproot with a branched caudex; leaves linear or linear-oblongate, 2–11 mm. broad, basal leaves 7–19 cm. long, entire or some 2- or 3-lobed, the petiole-bases broadly expanded, papery, not long-villous, stem-leaves entire or 2–5-lobed; heads corymbose; pappus-scales 5–7, 2.5–3.3 mm. long, acuminate, about $\frac{2}{3}$ as long as the disk-corollas. —Known only from two locations in Colorado, one in Utah, and in the Lukachukai Mountains, Apache County, Arizona (*Peebles 14401*, June 23, 1939). This Arizona collection was erroneously determined as *H. Lemmonii* (Greene) Cockerell in "Arizona Flora"². (That species has not been found in Arizona.)

The involucre and the peduncles just below are sparingly to densely villous in *H. helenioides*, while in *H. Lemmonii* they are mostly scurfy-glabrate (except along the margins of the phyllaries) and densely resin-dotted. Also the principal leaves of *H. Lemmonii* are always divided, usually into 3 to 11 (or rarely to 20) lobes.

A PARTHENIUM NEW TO ARIZONA. In 1958 *Parthenium confertum* Gray var. *lyratum* (Gray) Rollins [*P. lyratum* (Gray) Gray] was collected in a grassy draw along Sala Ranch Road, northeast of Tombstone, Cochise County, Arizona, by L. N. Goodding (*No. 433–58*). This collection, which is on file in the Herbarium of the University of Arizona, represents a westward range-extension of this plant from Texas, New Mexico, and northeastern Mexico. From *P. incanum* H.B.K., which is already known from the state, it may be readily distinguished by its herbaceous, rather than frutescent, habit.—CHARLES T. MASON, JR., University of Arizona, Tucson.

NEW INFORMATION ON THE DISTRIBUTION
OF *CLARKIA DAVYI* AND *C. PROSTRATA*

BY HARLAN LEWIS AND PETER H. RAVEN

University of California, Los Angeles

Since the publication of the recent monograph of the genus *Clarkia* by Lewis and Lewis (Univ. Calif. Publ. Bot. 20: 241-392, -1955), additional evidence has been obtained concerning the distribution of two polyploid species of section *Godetia*, *Clarkia Davyi* (Jeps.) Lewis & Lewis and *C. prostrata* Lewis & Lewis. Generally, the tetraploid ($n=17$) *C. Davyi* has relatively small lavender petals that are cream or yellow near the base, whereas *C. prostrata*, which is an allohexaploid ($n=26$) derived from hybridization between *C. Davyi* and *C. speciosa*, has larger petals similarly colored but usually with a conspicuous reddish spot at the junction of the two colors. These differences are not always readily observable in herbarium specimens.

Although the southern limit of *C. Davyi* was formerly believed to be in northern San Mateo County, we have recently grown two progenies in the experimental garden from farther south: Pigeon Point, San Mateo County, *Raven 14455* (17 pairs of chromosomes); Cowell Property, adjacent to Empire Grade, 2 miles northwest of Santa Cruz, Santa Cruz County, *V. F. Hesse 2508* (17 pairs). The only other collection from this county was made by M. E. Jones in 1881 and was apparently misidentified as *C. prostrata* by Lewis and Lewis. The present collection resulted from a deliberate search by Miss Hesse for several seasons to rediscover the material collected by Jones.

The positive determination of the two collections mentioned above as *C. Davyi* suggests that collections from northern Monterey County previously identified as *C. prostrata* (Lewis and Lewis, op. cit., p. 298) are also probably referable to *C. Davyi*, but no recent collections have been made from this area. Furthermore, an herbarium specimen from Burton Mesa, near Lompoc, Santa Barbara County, that has recently come to our attention (herbarium of the Santa Barbara Museum of Natural History) appears to be *C. Davyi*. If this is so, it adds additional doubt to that expressed in the monograph concerning the identification of material from Santa Rosa Island as *C. prostrata*. Although we still have been unable to obtain living material we suspect that the plant on Santa Rosa Island is also *C. Davyi*.

The information that we now have leads us to believe that *C. prostrata* is limited in its distribution to the sea bluffs of northern San Luis Obispo County south of the Santa Lucia Mountains. These mountains apparently provide an effective barrier to migration of both species at the present time. A collection of *C. prostrata* from northern San Luis Obispo County not previously reported has also been examined chromosomally: ocean bluffs, 2.3 miles north of crossing of Arroyo de la Cruz on California State Highway 1, *Raven 13007* (26 pairs). These plants approach *C. Davyi* morphologically in their relatively small, unspotted petals.

The restricted distribution of *C. prostrata* that we suggest is in agreement with its apparently recent and demonstrated allohexaploid origin. Furthermore if the insular and mainland populations in Santa Barbara County prove to be *C. Davyi*, as we now believe, it would lend additional support to our suggestion (Brittonia, in press) that it had a wide distribution in the Pleistocene.

HERB-ROBERT NATURALIZED IN CALIFORNIA. On May 11, 1956, *Geranium Robertianum* L. was found persisting without cultivation in a moist, shady place along Strawberry Creek above the California Memorial Stadium, Berkeley, Alameda County (my No. 9243). It has also been noted spreading into similar areas in other parts of Berkeley, and may be sought elsewhere in the state, for it has long been cultivated rather widely.*

From the native and other naturalized species of *Geranium* found in California, *G. Robertianum* may be distinguished by its leaves, which are divided into 3 to 5 distinct pinnatifid leaflets, the terminal leaflet being stalked, and by its carpel bodies, which promptly separate from the style. It is a native of eastern North America, Eurasia, and northern Africa.—PETER H. RAVEN.

A NEW COMBINATION IN SALVIA. *Salvia Dorrii* (Kellogg) Abrams subsp. *Mearnsii* (Britton) McClintock, comb. nov. *Audibertia Mearnsii* Britton, Trans. N. Y. Acad. Sci. 8: 71 (1889). *Salvia carnosa* Dougl. ex Benth. subsp. *Mearnsii* (Britton) Epling, Ann. Mo. Bot. Gard. 25: 131 (1938).—ELIZABETH McCLINTOCK.

* Cf. Howell, Raven, and Rubtsoff, A Flora of San Francisco, p. 96 (1958).

NEW AND NOTEWORTHY NORTHWESTERN PLANTS

PART 11. ELYMUS, LUZULA, IRIS, AND DELPHINIUM

BY HAROLD ST. JOHN¹

GRAMINEAE

Elymus cinereus Scribn. & Merr. forma **laevis** St. John, forma nova. Laminis vaginisque laevibus. (Leaves and sheaths glabrous.)

WASHINGTON: Clark's Springs, 10 miles north of Spokane, July 7, 1902, F. O. Kreager 107 (holotype, UC).

JUNCACEAE

Luzula multiflora (Retz.) Lejeune var. **comosa** (E. Mey.) St. John, comb. nov. *L. comosa* E. Mey., Syn. Luzula 21 (1823). *L. campestris* (L.) DC. var. *comosa* (E. Mey.) Fern. & Wieg., Rhodora 15: 41 (1913). *L. multiflora* (Retz.) Lejeune subsp. *comosa* (E. Mey.) Hultén, Lunds Univ. Årsskr. N. F., Avd. 2, 39(1): 437, 438 (1943).

IRIDACEAE

Iris missouriensis Nutt. var. **missouriensis forma alba** St. John, forma nova. Floribus albis. (Flowers white.)

WASHINGTON: Pullman, June 4, 1893, C. V. Piper (WS); between Pullman and Wawawai, three clumps of iris with pure white flowers were found, June 3, 1916, F. L. Pickett (holotype, WS). IDAHO: Latah Co., near Genesee, May 10, 1925, W. D. Swope (WS); Latah Co., fescue-wheatgrass zone, May 30, 1938, R. F. Daubenmire 38,134 (WS).

The name *Iris missouriensis albiflora* Cockerell, West Am. Sci. 6: 135 (1889), was published without a description, and seems not to have been validated subsequently.

RANUNCULACEAE

Delphinium occidentale (Wats.) Wats. var. **griseum** St. John, var. nov. Differt in rhachidibus adpresse griseo-puberulis, corollis extra subadpresse pilosis, pilis omnibus eglandulosis. (Differs from var. *occidentale* by having the inflorescence and the axis of the spikes densely appressed-gray-puberulent and the corolla subappressed-pilose without; all the hairs being non-glandular.)

Specimens examined. WASHINGTON: on high ridges of the Blue Mts., Walla Walla Co., July 15, 1896, C. V. Piper 2442 (holotype, WS); Blue Mts., July, 1897, R. M. Horner 267 (WS).

This was treated as *D. scopulorum* Gray, in the present author's Flora of Southeastern Washington, rev. ed., 152 (1956). The new epithet is from the Latin *griseus*, gray, in allusion to the significant close cinereous pubescence of the inflorescence.

¹ Professor of Botany, Université de Saigon, Vietnam.

LEAFLETS
of
WESTERN BOTANY

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A REVISION OF *SENECIO INTEGERRIMUS*
NUTTALL AND ALLIED SPECIES*

BY THEODORE M. BARKLEY

New York Botanical Garden

This study includes the western North American species of *Senecio* which are perennial, in which the usually solitary stems arise from a very short, erect, fibrous-rooted caudex, which have a basal tuft of petiolate, not deeply incised leaves that become progressively smaller up the stem, and which have erect heads. *Senecio integerrimus* is regarded as the most characteristic species. With the possible exception of *S. crassulus*, these species are believed to constitute a wholly natural group.

Senecio integerrimus and its allies are distributed from Minnesota to the Pacific States, and from south-central Alberta to central California. The greatest amount of variation occurs from the Cascade Mountains of Washington and Oregon to central Idaho, where four species and three varieties of the *S. integerrimus* group occur.

Gray's Synoptical Flora (1884) contains the only previous account of this assemblage in its entirety. Greenman (1910) published a key to sections and a list of specific names referable to each section of *Senecio* in North America. Excepting *S. crassulus*, he placed all of the species included here in his section *Columbiani*. Altogether he recognized twenty-two sections for North and Central America, but published revisions only of the first eight sections. The ninth section, *Columbiani*, was never revised.

Gross morphological structure furnishes the basic taxonomic criteria in this group. The most consistent characters are in the presence or absence of parts and in the relative size and number of parts. The presence or absence of pubescence on mature plants provides a convenient character for recognizing two nearly distinct groups. The size and shape of involucre bracts are distinctive in some instances, as is the number of bracts present. The bracts and rays tend to be present in numbers corresponding to the Fibonacci series. The size and shape of the leaves furnish characters of secondary importance.

The species are defined by more or less consistent morphological characters, with supporting ecological differences. The

* Condensed and revised from a thesis submitted in May, 1957, to Oregon State College in partial fulfillment of the requirements for the Master of Science degree.

varieties are separated on less consistent morphological characters supported by geographic distribution. There is a definite intergradation between the varieties in areas of range overlap. Occasional specimens are even intermediate between species. A total of five species, one with two varieties and one with six varieties, are recognized in the present revision.

In Rydberg's *Flora of the Rocky Mountains and Adjacent Plains* (1917), eighteen species are recognized which fall within the limits of the present study. One can sympathize with Rydberg, as the morphological variance is great and the several taxa are found in a wide variety of habitats. On the other hand, recognizing a few well-defined species and accounting for the less consistent differences with infraspecific taxa seems to produce a more reasonable treatment.

In the course of this study, more than 4000 specimens have been examined. As several successive collections have frequently been made in the same general locality, the dots on the distribution maps do not indicate the number of collections. Only representative specimens are cited, but a nearly complete list of citations is included in the thesis which is on file at the Oregon State College Library, Corvallis, Oregon.

Specimens were borrowed from the following institutions. The symbols used in the specimen citations are in accord with Lanjouw and Stafleu, *Index Herbariorum*, Part I (1959).

California Academy of Sciences.....	CAS
Gray Herbarium, Harvard University.....	GH
University of Idaho.....	ID
Kansas State College.....	KSC
Missouri Botanical Garden.....	MO
Montana State College.....	MONT
New York Botanical Garden.....	NY
University of Oregon.....	ORE
Oregon State College.....	OSC
Academy of Natural Sciences of Philadelphia.....	PH
Rocky Mountain Herbarium, University of Wyoming..	RM
University of California.....	UC
State College of Washington.....	WS
University of Washington.....	WTU

The disposition in synonymy of many of the names is based upon isotypes. Except where noted, no distinction between holotypes and isotypes is made in the citations. Some type specimens were seen at the United States National Herbarium, and are cited as US. As I have not had an opportunity to visit the

Greene Herbarium, it has not been possible to typify definitely some of Greene's names.

I am particularly grateful to the late Dr. Albert N. Steward, Curator of the Herbarium of Oregon State College, under whose watchful guidance this revision was prepared. Dr. Arthur Cronquist of the New York Botanical Garden originally suggested the problem, and he has kindly reviewed the final paper. I am grateful to the curators of the above-named institutions for loaning the specimens upon which the study is based.

KEY TO SPECIES

- 1a. Plants glabrous, or minutely pubescent in the leaf-axils and at the base.
 - 2a. Heads 3-6 (12); cauline leaves well developed, frequently larger than the basal leaves; plants 2-3 (5+) dm. tall. Plants of upland areas and dry meadows.....1. *S. crassulus*
 - 2b. Heads many in well-developed plants, rarely less than 20; cauline leaves reduced, typically progressively reduced upwards; plants 3-12 (20) dm. tall. Plants of wet areas.
 - 3a. Herbage glaucous; leaves fleshy, entire to slightly denticulate; plants commonly well over 10 dm. tall. Plants of swamps, tolerant of standing water.....2. *S. hydrophilus*
 - 3b. Herbage not glaucous; leaves often firm, but not fleshy, toothed to occasionally subentire; plants seldom over 10 dm. tall. Plants of wet hillsides and wet meadows, but not of swamps or alkaline places.....3. *S. foetidus*
- 1b. Plants pubescent, or occasionally becoming glabrate in age.
 - 4a. Heads discoid (1 or 2 short rays occasionally present), small, 15-20-flowered; involucre bracts 8-13 in number, 5-9 mm. long; leaves repand-denticulate to lacinate, or rarely subentire. California.4. *S. aronicoides*
 - 4b. Heads radiate (discoid in var. *Vaseyi*, rarely so in other vars.), larger, 20-50-flowered; involucre bracts 7-12 mm. long; leaves usually subentire.....5. *S. integerrimus*

1. *SENECIO CRASSULUS* Gray, Proc. Amer. Acad. 19:54 (1883). Type coll.: Parry 24, Mountains of Colorado (GH!).

S. semiamplexicaulis Rydb., Mem. N. Y. Bot. Gard. 1:440 (1900). (Misspelled "semiplexicaulis"; a printer's error later corrected. The name is correctly spelled on the type.) Type coll.: Rydberg & Bessey 5251, East De Lacy's Creek, Yellowstone Park (NY!).

S. lapathifolius Greene, Plantae Bakerianae 3:25 (1901). Type coll.: Baker 738, between Ouray and Telluride, Colorado (GH!, NY!, US!).

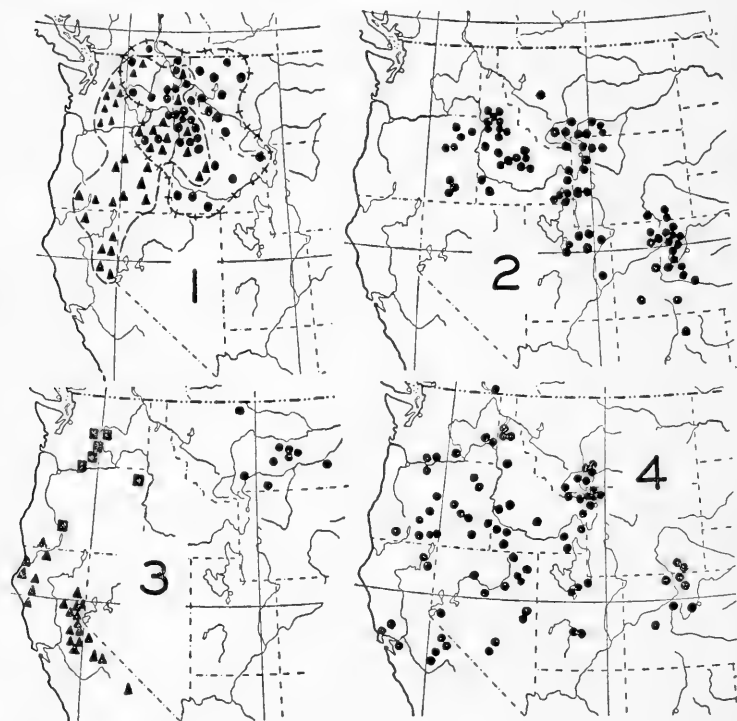
Herbage glabrous; stem 2-5 dm. tall, exceptionally as tall as 7 dm. or as short as 1.5 dm., arising from a short, erect or weakly spreading caudex that is often branched and with clustered stems; leaves broadly ovate to spatulate, entire to sharply dentate, 3-15 cm. long and 1.5-5 cm. wide; lower cauline and basal leaves petiolate, becoming more or less sessile and clasping up the

stem; middle cauline leaves frequently larger than the basal leaves: inflorescence generally open, heads several but occasionally only one; terminal peduncle rarely conspicuously foreshortened; involucre bracts mostly 5–9 mm. long, usually linear-oblong, with a blackish, slightly villous triangle-shaped tip, commonly thirteen to twenty-one, but frequently only about eight; ray-corollas yellow, 5–12 mm. long, about eight to thirteen present.

Northern New Mexico to Montana, west to eastern Oregon, and reputedly in South Dakota. In dry to moist open woodlands and meadows from the foothills to rather high elevations in the mountains. Map 2.

Representative material:

COLORADO. Chaffee Co.: Manassas Creek, *Clokey 3464* (CAS, GH, NY, UC, WS). Lake Co.: near Independence Pass, *Barkley 104* (undistributed). IDAHO. Bear Lake Co.: Bloomington Lake, *Davis 1629* (NY, UC, WS). Idaho Co.: west of Riggins, *Kruckeberg 3185* (NY, OSC, UC, WS, WTU). MONTANA. Park Co.: southeast of Cooke City, *Hitchcock & Muhlick 13613* (CAS, GH, MONT, NY, PH, WS, WTU). Sweetgrass Co.: Blue Lake, *Hitchcock &*



Map 1. Triangles, *Senecio foetidus* var. *foetidus*; dots, *Senecio foetidus* var. *hydrophiloides*.

Map 2. *Senecio crassulus*.

Map 3. Dots, *Senecio integerrimus* var. *Scribneri*; squares, *Senecio integerrimus* var. *Vaseyi*; triangles, *Senecio integerrimus* var. *major*.

Map 4. *Senecio hydrophilus*.

Muhlick 13235 (NY, PH, WS, WTU). NEW MEXICO. Mora Co.: Truchas Peak, *Standley 4794* (NY). OREGON. Baker Co.: Anthony Lakes region, *Thompson 13437* (CAS, GH, MO, NY, PH, UC, WTU). Grant Co.: Strawberry Mts., *Cusick 3540* (GH, NY, UC, WS, WTU). UTAH. Salt Lake Co.: Mt. Millicent, *Garrett 1522* (GH, NY, PH). Summit Co.: Lamotte Peak, *Goodman 2012* (GH, MONT, NY). WYOMING. Albany Co.: Centennial, *Nelson 8708* (GH, NY). Sublette Co.: Gros Ventre Mts., *Payson & Payson 3020* (GH, NY, PH).

The relationship between *S. crassulus* and *S. integerrimus* is uncertain. The sizable rootstocks, which may be definitely woody, are unlike the underground parts of *S. integerrimus*. Equally foreign is the habit in *S. crassulus* of producing cauline leaves larger than the basal leaves. However, some specimens of *S. crassulus* look sufficiently like *S. integerrimus* to warrant its inclusion in this study.

At higher elevations (7000 to 9000 ft.) in Idaho, the typical form of *S. crassulus* appears to be replaced by a small-headed phase with involucre bracts 3–4 mm. long, and with only a minute dark tip.

The name *Senecio crassulus* var. *Cusickii* (Piper) Greenman appears in Peck's Manual of the Higher Plants of Oregon, page 780 (1941). The name is probably based upon a combination using *Cusickii* as the specific epithet which appears on specimens in the State College of Washington Herbarium, but which was never validly published. Greenman's use of the name with varietal status appears to have been first published in Peck's Manual, but without Latin diagnosis. The name, therefore, is not validly published.

2. *SENECIO HYDROPHILUS* Nuttall, Trans. Amer. Phil. Soc. II. 7:411 (1841). Type coll.: Nuttall, "Rocky Mountains, by Ham's Fork of the West" (not seen).

S. hydrophilus var. *pacificus* Greene, Pittonia 1:220 (1888). *S. pacificus* Rydb., Fl. Rocky Mts. and Adj. Plains 998 (1917). Type coll.: Greene, "near the Bay of San Francisco." Specimens collected by Greene and distributed by him as var. *pacificus* Greene were collected: "West Berkeley, 23 Aug., 1888" and "n. w. Berkeley, 28 Sept., 1888" and are in Herb. NY! Other specimens PH!, UC!

Herbage glabrous, rather glaucous, sea-green in color: stem stout, hollow, commonly 4–10 dm. tall, but frequently up to 2 m. or more, arising from a cluster of fleshy fibrous roots: leaves thickened and somewhat succulent, entire or denticulate; basal and lower cauline leaves petiolate, with narrowly elliptic to oblanceolate blades, 10–30 cm. long by 1–10 cm. wide, or larger on exceptionally robust specimens; middle and upper cauline leaves strongly reduced, becoming sessile: heads usually quite numerous, in a large, loose

inflorescence; involucre bracts narrow, 5–8 mm. long, frequently black-tipped; rays when present, few, yellow, short, 3–8 mm. long.

Central California, north to British Columbia, east to Montana and Colorado, and reputedly South Dakota. Swampy places in the lower foothills and valleys; tolerant of standing water and alkaline situations. Common in its habitat. Map 4.

Representative material:

BRITISH COLUMBIA. Mouth of Salmo River, *Macoun 64999* (GH, NY). CALIFORNIA. Marin Co.: Laguna in Chileno Valley, *Rose 46280* (GH, NY, UC). Santa Clara Co.: Palo Alto, *Baker 1715* (CAS, MO, NY, UC, WS). COLORADO. Larimer Co.: North Fork, *Goodding 1923* (GH, NY, PH, UC). IDAHO. Kootenai Co.: Lake Pend Orielle, *Sandberg 938* (CAS, GH, NY, WTU). Owyhee Co.: Riddle, *Baker 8499* (ID, NY). MONTANA. Beaverhead Co.: Red Rock River, *Jennison s.n.* (MONT). Madison Co.: Ennis, *Blankinship s.n.* (GH). NEVADA. Elko Co.: Deeth, *Heller 10552* (CAS, GH, NY, UC). Nye Co.: Mohawk Ranger Station, *Train 3374* (NY, UC, WTU). OREGON. Hood River Co.: (?) Columbia River near the Cascades, *Howell s.n.* (NY, OSC, PH, UC, WS). Klamath Co.: Klamath Marsh, *Leiberg 630* (GH, MO, NY, ORE, WS). UTAH. Sevier Co.: Fish Lake, *Maguire 17801* (GH, WTU). WASHINGTON. Spokane Co.: Spokane, *Kreager 556* (GH, NY, UC, WS, WTU). WYOMING. Albany Co.: Laramie, *Nelson 8089* (GH, NY). Yellowstone Park: Upper Madison Canyon, *Rydberg & Bessey 5257* (GH, MONT, NY, UC).

Throughout the range of the species, specimens with discoid heads occur intermixed in the same populations with those with radiate heads. The names *S. hydrophilus* var. *pacificus* Greene and *S. pacificus* (Greene) Rydb. have been applied to these discoid individuals. However, as the presence or absence of rays appears not to be consistently correlated with any other character, the discoid form should not be recognized as a distinct entity.

3. *SENECIO FOETIDUS* Howell, *Flora N. W. America* 377 (Aug. 1900). Type coll.: *Howell*, Klickitat Valley, Washington (ORE!).

Herbage glabrous, or with scant pubescence in immature plants: stems 3–10 dm. tall, seldom taller, green or occasionally reddish below, arising singly or loosely clustered from a tuft of fibrous roots: leaves somewhat thickened but not succulent, margins sharply but not deeply dentate, basal and lower cauline leaves long-petiolate, elliptic to broadly oblanceolate, 6–25 cm. long and 2–7 cm. wide, upper cauline leaves few, strongly and progressively reduced, becoming sessile: inflorescence either congested or loose and open; heads rather numerous to occasionally as few as eight or ten; involucre bracts 4–9 mm. long, linear-subulate, minutely to strongly black-tipped; rays, when present, few, five to eight, yellow, 5–10 mm. long.

From the Sierra Nevada in California north to British Columbia, east through Idaho to western Montana. Rather common around marshy lake shores and wet meadows at middle elevations. Not found in alkaline situations.

Two varieties are here recognized which have historically been treated as

distinct species. They occur in essentially similar habitats, and their ranges are different but overlapping. The populations appear to maintain their identities but are obviously connected by a large series of intermediates. Therefore, these are regarded as varieties of one well-defined species.

KEY TO VARIETIES OF *SENECIO FOETIDUS*

- 1a. Inflorescence congested; heads often discoid; stems frequently loosely clustered.....3a. var. *foetidus*
 1b. Inflorescence open; heads usually radiate; stems arising singly.....
3b. var. *hydrophiloides*

3a. *SENECIO FOETIDUS* var. *FOETIDUS*. *S. foetidus*. Howell, Flora N.W. America 377 (Aug. 1900).

Stems arising singly or loosely clustered; inflorescence generally closely congested; rays about five, or often absent.

California to central Washington, and east to northeastern Oregon and Idaho. More abundant in wet areas in the foothills and meadows along the western edge of the range. Definitely intergrading with var. *hydrophiloides* in Idaho. Map 1 (triangles).

Representative material:

CALIFORNIA. Nevada Co.: Dog Valley, *Heller 10895* (GH, MO, NY, PH, UC). Plumas Co.: Red Clover Valley, *Heller & Kennedy 8878* (CAS, MO, NY, PH, UC). IDAHO. Custer Co.: Stanley Lake, *Hitchcock & Muhlick 9605* (CAS, GH, MONT, NY, PH, UC, WS). Elmore Co.: Toll Gate Ranch, *Macbride & Payson 2866* (CAS, GH, NY, UC). OREGON. Crook Co.: Indian Creek, *Cronquist 7432* (CAS, GH, ID, NY, OSC, UC, WS). Morrow Co.: between Spray and Hardman, *Cronquist 6629* (ID, NY, OSC, WS, WTU). WASHINGTON. Chelan Co.: Wenatchee Mts., *Thompson 11757* (GH, MO, MONT, NY, WS, WTU). Kittitas Co.: Ellensburg, *Thompson 8364* (CAS, GH, NY, UC, WTU).

In the original description, Howell mentions that this plant has a strong odor and that even after twenty years in the herbarium the odor is still to be detected. Howell's type is now over sixty years old and does not now have any characteristic odor, but this may be due to age. However, none of the other individuals of this entity, as I understand it, possesses a strong, long-lasting odor, as apparently the type did. The type does not look like the majority of specimens in the entity but it easily falls within the normal latitude of the variation.

3b. *SENECIO FOETIDUS* var. *HYDROPHILOIDES* (Rydb.) T. M. Barkley in Ferris, Contrib. Dudley Herbarium 5 (4):102 (1958). *S. hydrophiloides* Rydb., Mem. N. Y. Bot. Gard. 1:441. (Oct. 1900). Type coll.: *Heller 3473*, Idaho (NY!).

S. pereziiifolius Rydb., Mem. N. Y. Bot. Gard. 1:440 (1900). Type coll.: *Rydberg & Bessey 5252*, Jack Creek, Montana (NY!).

Stems arising singly; inflorescence loose and open, corymbiform, with many heads; rays eight to five, or rarely absent.

Northeastern Oregon, central and eastern Washington, adjacent British Columbia, and east through Idaho to Montana. Map 1 (dots).

Representative material:

BRITISH COLUMBIA. Sheep Creek between Kettle and Columbia rivers, *Macoun 64998* (NY). IDAHO. Adams Co.: south of New Meadows, *Hitchcock & Muhlick 13919* (NY, UC, WS, WTU). MONTANA. Mineral Co.: west of Saltese, *Cronquist 6730* (NY, WS, WTU). OREGON. Umatilla Co.: Langdon Lake, *Peck 22235* (NY). Union Co.: Moffitt Meadows, *Lawrence WF166* (OSC). WASHINGTON. Lincoln Co.: Wilbur, *Thompson 11677* (CAS, GH, MO, NY, PH, WTU). Spokane Co.: Mt. Spokane, *Thompson 9202* (MO, NY, WTU).

In Peck's Manual of the Higher Plants of Oregon (1941) the name *S. exaltatus* var. *Rammii* (Greene) Greenman is used for this entity. Apparently it is based upon an unpublished name appearing on herbarium sheets where *Rammii* is used as the specific epithet. Peck's Manual seems to be the place of original publication, but as there is no Latin diagnosis, the name is invalid.

Occasional herbarium specimens bear the name *hydrophiloides* Rydb. as a varietal epithet of *S. exaltatus*. This combination was made in annotations by Greenman, but I believe it was never published.

4. *SENECIO ARONICOIDES* DC., Prod. 6:426 (1837). Type coll.: *Douglas* "in California" (not seen).

S. exaltatus var. *uniflosculosus* Gray, U. S. War Dept. Pacif. Rwy. Report 4:111 (1856) (misspelled "uniflosculus"). Type coll.: *Bigelow*, Grass Valley, California (GH!, NY!).

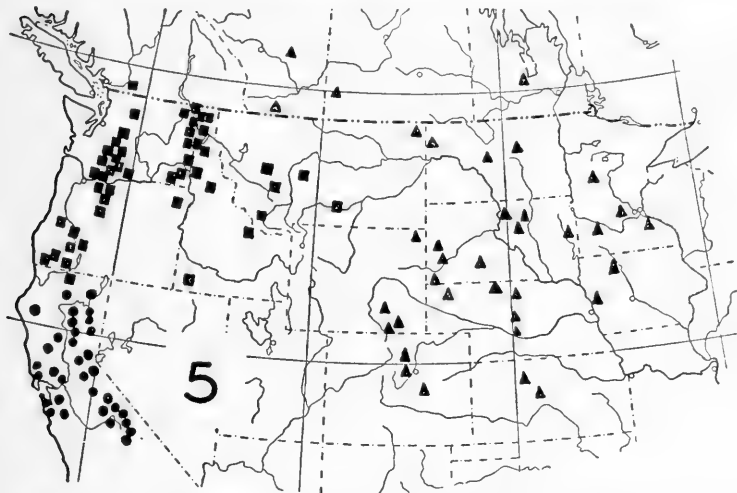
S. Rawsonianus Greene, Pittonia 2:166 (1891). Type coll.: *Mrs. L. A. Rawson Pekinpah*, in the Sierra, Fresno Co., California (NY!, UC!).

S. leptolepis Greene, Flora Franciscana 468 (1897). Type coll.: *Hansen*, Amador Co., California. (*Hansen 417*, which may represent this collection, MO!).

Herbage varying from loosely and sparsely arachnoid-pubescent to finely tomentose; stems 3–9 dm. tall, arising singly from a cluster of fibrous roots; basal and lower cauline leaves varying from ovate to oblanceolate or oblong, 8–30 cm. long and 2–13 cm. wide, margins irregularly and variously dissected, ranging from repand denticulate to lacinate or even subentire; upper cauline leaves reduced, irregularly toothed or rarely entire, sometimes auricled at the base; inflorescence few- to many-headed, loose, or occasionally tightly congested; involucre bracts eight to thirteen, oblong-lanceolate to lanceolate, 4–8 mm. long, with or without black tips; heads with 15–20 flowers, or occasionally more; rays one or two, or more commonly absent.

In the Coast Ranges of California from Santa Clara County north to Siskiyou and Modoc counties, then south, primarily along the western slope of the Sierra Nevada to Tulare County. Reputedly in southern Oregon. Rather dry places in open forest areas in the foothills and lower mountains. Map 5 (dots).

CALIFORNIA. Butte Co.: Chico Meadows, *Heller 11967* (GH, MO, MONT, NY, OSC, WTU). Fresno Co.: Pine Ridge, *Hall & Chandler 116* (NY, UC). Glenn Co.: Bennett Spring, *Heller 12013* (GH, MO, NY, OSC, PH, UC, WTU). San Mateo Co.: San Bruno Hills, *Baker 1900* (GH, MO, NY, UC).



Map 5. Dots, *Senecio aronicoides*; squares, *Senecio integerrimus* var. *ochroleucus*; triangles, *Senecio integerrimus* var. *integerrimus*.

Siskiyou Co.: near Sisson, *Heller 8029* (GH, MO, NY, PH, UC). Sonoma Co.: Bodega Bay, *Heller & Brown 5264* (GH, MO, NY, PH). Tuolumne Co.: Twain-Harte, *Alexander & Kellogg 3601* (MO, NY).

In the vicinity of San Francisco Bay and northward along the western slope of the Coast Ranges, *S. aronicoides* is usually sparsely pubescent, large, robust, with rather irregularly incised leaves, and with many small heads in the inflorescence. On the east side of the Coast Ranges, in the Mt. Shasta area, and progressing south in the Sierra Nevada, the species gradually becomes more pubescent, even densely so, shorter, with leaves less deeply and irregularly incised to even subentire, and with fewer, larger heads.

In the southern part of its range in the Sierra Nevada, *S. aronicoides* intergrades to a limited extent with *S. integerrimus* through extreme forms of *S. integerrimus* var. *major*. However, the majority of specimens are readily referable to one entity or the other. Although closely related to *S. integerrimus*, *S. aronicoides* is distinct over most of its range, supporting its maintenance as a separate species.

5. *SENECIO INTEGERRIMUS* Nuttall, Gen. N. Am. Plants 2:165 (1818). Type coll.: Nuttall "on the plains of the Missouri near the great bend" (photograph NYI).

Herbage arachnoid-villous with jointed, crisp hairs, occasionally tomentose, frequently becoming glabrate in age, or early glabrate in one variety but then at least pubescent among the heads in the inflorescence and in leaf-axils: stems solitary, 2-7 dm. tall, arising from a cluster of fibrous roots: basal and lower cauline leaves thin or somewhat thickened but hardly succulent; margins entire to variously and irregularly dentate, petiolate but sometimes indistinctly so, narrowly oblanceolate to subcordate, 6-25 cm. long and 1-6 cm. wide; upper cauline leaves strongly and progressively reduced upwards, becoming sessile: inflorescence of few to numerous heads, loose and open or sometimes congested, particularly so in specimens from high altitudes; involucre bracts 7-12 mm. long or occasionally as short as 5 mm., subulate to lanceolate or even oblong, commonly but not always black-tipped, usually about twenty-one present but sometimes about thirteen; rays present in all but var. *Vaseyi*, yellow, or ochroleucous to white in var. *ochroleucus*, 6-15 mm. long.

From central California north to British Columbia and east to Minnesota, encompassing the ranges of the allied species. Moderately dry to moist areas in open forests and prairies from lower valleys to near timberline.

KEY TO VARIETIES OF *SENECIO INTEGERRIMUS*

- 1a. Rays white or ochroleucous, basal leaves with definite petiole, frequently ovate or subcordate.....5a. var. *ochroleucus*
- 1b. Rays yellow (when present); basal leaves with or without definite petiole, shape various.
 - 2a. Pubescence normally scanty at flowering time; involucre bracts subulate, only minutely, if at all, black-tipped. Plants of the Great Plains.....5b. var. *integerrimus*
 - 2b. Pubescence more or less abundant at flowering time; involucre bracts broader at the middle than subulate, except in var. *major*.
 - 3a. Involucre bracts 10-15 mm. long, slightly, if at all, black-tipped; heads few, seldom more than 6; lower leaves almost linear, 0.5-2 cm. by 6-10 cm. Central Montana.....5c. var. *Scribneri*
 - 3b. Involucre bracts 6-12 mm. long, rarely longer, with or without black tips; heads characteristically several to many, or occasionally few in var. *major* but then plants with broad leaves.
 - 4a. Rays absent.....5d. var. *Vaseyi*
 - 4b. Rays present (rarely absent in occasional specimens from normally radiate populations).
 - 5a. Involucre bracts 8-12 mm. long, narrow, linear-subulate, minutely, if at all, black-tipped; pubescence copious. California.....5e. var. *major*
 - 5b. Involucre bracts 5-10 mm. long, rarely longer, shape variable but only rarely linear-subulate, usually black-tipped; pubescence varying from rather scanty to copious. Widespread...5f. var. *exaltatus*

Senecio integerrimus is highly variable, both morphologically and ecologically. Specimens intermediate between two varieties do occur, especially in areas of range overlap, but rarely do entire populations lie intermediate between two varieties. The great majority of specimens are readily referable to one or another of the varieties.

Although *S. integerrimus* var. *integerrimus* is nomenclaturally typical, var. *exaltatus* is the most widespread and by far the most variable entity involved in the study. All of the other varieties are connected morphologically through var. *exaltatus*.

In addition to the six varieties recognized here, there are two groups of specimens whose taxonomic status is yet unresolved because of insufficient data.

Some specimens from southwestern Colorado and adjacent Utah have pubescent achenes. This is a characteristic of *S. sphaerocephalus* Greene, a species easily excluded by its large, horizontal rootstock, and by the nature of its pubescence. The evaluation of pubescence on the achenes as a taxonomic character, and determination of whether or not there is any connection with *S. sphaerocephalus*, must wait until more field work has been done.

From a swamp near Alsea, Oregon, Mr. Ted Sims of Corvallis, Oregon, has recently collected several specimens which have the stature of *S. hydrophilus* and which grew in its habitat but which have the pubescence of *S. integerrimus*. More field work and perhaps experimentation will be necessary before the best disposition of these specimens can be determined.

5a. *SENECIO INTEGERRIMUS* VAR. *OCHROLEUCUS* (Gray) Cronq., Leaf. West. Bot. 6:48 (1950). *S. lugens* var. *ochroleucus* Gray, Synoptical Flora 1(2):388 (1884). Type coll.: Suksdorf, on Columbia River, Klickitat Co., Washington (US!).

S. cordatus Nuttall, Trans. Amer. Phil. Soc. 11:7:411 (1841). *S. exaltatus* var. *ochraceus* Piper, Contrib. U. S. Nat. Herb. 11:600 (1906). *S. ochraceus* Piper in Piper & Beattie, Fl. N. W. Coast 389 (1915). Type coll.: Nuttall, "near the outlet of the Wahlamet, Oregon" (not seen).

S. Leibergii Greene, Leaf. Bot. Obs. & Crit. 1:221 (1906). Type coll.: Leiberg, Pend d'Orielle River, Kootenai Co., Idaho (not seen).

Basal leaves subcordate to deltoid or broadly ovate, occasionally narrower, petiole nearly always distinct; rays white or ochroleucous (cream-colored), up to 15 or even 20 mm. long.

Northern California to British Columbia, east to Montana. Rather moist

habitats in forested areas; seldom, if ever, extending into open valleys. Map 5 (squares).

Representative material:

BRITISH COLUMBIA. Sproat, *Macoun s.n.* (GH). CALIFORNIA. Siskiyou Co.: Yreka, *Greene s.n.* (GH). IDAHO. Bonner Co.: Priest River, *Baker 8972* (ID, NY). Kootenai Co.: Spokane River, *Christ 10916* (ID, NY). MONTANA. Lewis and Clark Co.: South Gibson Lake, *Hitchcock 18000* (NY). Yellowstone Co.: Laurel, *Wright & Wright s.n.* (MONT). OREGON. Hood River Co.: Bald Butte, *Armstrong 457* (NY). Josephine Co.: Perham Creek, *Detling 7273* (ORE). WASHINGTON. Ferry Co.: Kettle Falls, *Rogers 423* (GH, MO, NY, UC, WS, WTU). Klickitat Co.: western part, *Suksdorf 23* (GH, MO, NY, PH, UC, WS). Pend Orielle Co.: South Baldy, *St. John 8816* (GH, MO, NY, OSC, UC, WS, WTU) and *St. John 8817* (WS, WTU).

Var. *ochroleucus* is one of the most satisfactory varieties. The broad, obviously petiolate leaves are characteristic of most specimens, although there are series of specimens showing morphological gradation into the narrower leaves more typical of var. *exaltatus*.

White or cream-colored rays are typical of this variety, but in at least one population (*St. John 8817*, South Baldy, Pend Orielle Co., Washington) yellow-rayed individuals were collected. The collector estimated one yellow-rayed specimen to one hundred white-rayed.

5b. *SENECIO INTEGERRIMUS* var. *INTEGERRIMUS*. *S. integerrimus* Nuttall, Gen. N. Amer. Plants 2:165 (1818).

Pubescence deciduous and usually scanty by flowering time except for inconspicuous amounts among the heads in the inflorescence and in the leaf-axils: inflorescence with terminal peduncle not distinctly foreshortened; involucre bracts subulate, only minutely, if at all, black-tipped.

A variety of the Great Plains, ranging from Minnesota to the eastern base of the Rocky Mountains from Colorado to Canada. Map 5 (triangles).

Representative material:

ALBERTA. Whiskey Gap, *Moss 1135* (GH). COLORADO. Elbert Co.: Elbert, *Ownbey 1268* (GH, NY, WS). Jefferson Co.: Wyman, *Clokey 3072* (NY). IOWA. Palo Alto Co.: Lost Island Lake, *Hayden 9791* (CAS, GH, NY, PH, UC, WTU). KANSAS. Osborne Co.: Osborne, *Neher 479* (KSC). MANITOBA. Manitoba Lake, *Macoun 21* (GH). MINNESOTA. Meeker Co.: Litchfield, *Frost s.n.* (NY). MONTANA. Park Co.: Boulder River Canyon, *Hitchcock 16362* (WTU). NEBRASKA. Cherry Co.: Valentine, *Talstend s.n.* (GH). NORTH DAKOTA. Benson Co.: Leeds, *Lunell s.n.* (GH, NY, PH). SASKATCHEWAN. Palliser's Expedition, *Bourgeau s.n.* (GH, NY). SOUTH DAKOTA. Lawrence Co.: Deadwood, *Palmer 37153* (GH). Washabaugh Co.: Turtle Creek, *Oliver 2020* (WTU). WYOMING. Albany Co.: Centennial, *Rollins 921* (NY, WS).

Where the ranges of var. *integerrimus* and var. *exaltatus* overlap in Wyoming and Colorado, the distinction between the two becomes obscure. However, since the vast majority of speci-

mens from their whole ranges are easily referable to either one variety or the other, it seems best to maintain these entities as varieties.

5c. *Senecio integerrimus* var. *Scribneri* (Rydb.) T. M. Barkley, comb. nov. *S. Scribneri* Rydb., Mem. N. Y. Bot. Gard. 1:441 (1900). Type coll.: *Scribner 123b*, Livingston, Montana (GH!, NY!, US!). Holotype originally in the Canby Herbarium, which is now deposited in NY.

Distinctly pubescent; leaves narrow, 0.5–2 cm. wide and 6–10 cm. long; heads few, about six or occasionally more in number; involucre bracts 10–15 mm. long, rarely black-tipped; rays numerous, light yellow.

Apparently restricted to the plains and foothills of east-central Montana. Map 3 (dots).

Representative material:

MONTANA. Liberty Co.: Joplin, *Anderson & Scharff s.n.* (MONT). Musselshell Co.: Rounup, *Wright & Wright s.n.* (MONT). Rosebud Co.: east of Melstone, *Wright s.n.* (ID, MONT).

The abundant pubescence, large heads, and narrow leaves combine to make this a fairly distinct variety. The type specimen, named *S. Scribneri* Rydb., has a few more heads than is common for the entity as I understand it.

The variety is very poorly known, as is evidenced by the paucity of specimens in most herbaria; however, at Montana State College, there are a number of unicates. More extensive collections are needed for a proper understanding of this variety.

5d. *SENECIO INTEGERRIMUS* var. *VASEYI* (Greenm.) Cronq., Univ. Wash. Publ. Biol. 17(5):293 (1955). *S. Vaseyi* Greenm. in Piper, Contrib. U. S. Nat. Herb. 11:600 (1906). Type coll.: *Vasey 568*, Cascade Mts., Washington (NY!).

Ray florets consistently absent.

Central Washington in the Wenatchee Mt. area and adjacent Cascades, and in Klamath County and the Wallowa Mts., Oregon. Apparently not abundant. Map 3 (squares).

Representative material:

OREGON. Klamath Co.: Crater Lake National Park, *Baker 7120* (NY). Wallowa Co.: east of Imnaha, *Baker 9078* (NY). WASHINGTON. Kittitas Co.: Table Mts., *Thompson 9800* (MO, NY, UC, WTU). Klickitat Co.: Cascade Mts., *Henderson s.n.* (WS).

The technical character of rays present *vs.* rays absent would not by itself define a good variety in this species. Occasional discoid specimens are found in populations of the normally radiate varieties. However, var. *Vaseyi* is ecologically distinct. It occurs in small populations at middle and higher elevations, in habitats where other varieties of *S. integerrimus* do not occur.

5e. *SENECIO INTEGERRIMUS* var. *MAJOR* (Gray) Cronq., Aliso 4(1):100 (1958). *S. eurycephalus* var. *major* Gray, U. S. War Dept. Pacif. Rwy. Report 4:111

(1856). *S. Whippleanus* Gray, Proc. Amer. Acad. 19:54 (1884). *S. majus* Heller, Muhlenbergia 1:118 (1905). Type coll.: Bigelow, Murphy's, California (NY!).

S. mendocinensis Gray, Proc. Amer. Acad. 7:362 (1867). Type coll.: Bolander, Noyo, Mendocino Co., California (NY!).

S. caulanthifolius Davy, Erythea 3:117 (1895). Type coll.: Davy 1437, Murphy's Camp, Calaveras Co., California (not seen).

S. Sonnei Greene, Flora Franciscana 467 (1897). Type coll.: Sonne, "Castle Peak (otherwise called Mt. Stanford) north of Donner Lake," California (not seen).

S. mesadenia Greene, Leaflet Bot. Obs. & Crit. 2:227 (1912). Type coll.: Fulton, Mono Forest Reservation, California (UC!).

S. fondinarum Greene, Leaflet Bot. Obs. & Crit. 2:228 (1912). Type coll.: Coville & Funston 1491, near Mineral King, California (US!).

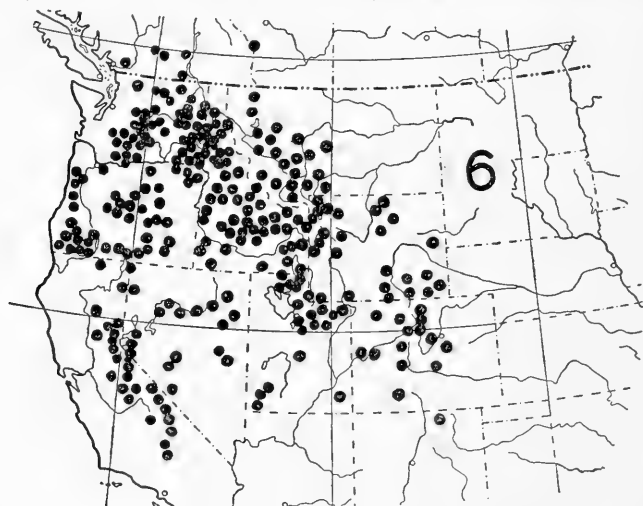
S. lugens var. *megacephalus* Jepson, Man. Fl. Pl. Calif. 1152 (1925). Type coll.: Jepson 668, mts. of Tulare Co., California (not seen).

Herbage pubescent, occasionally sparsely so in age: leaves entire to variously dentate or lacinate, but not deeply incised: heads frequently large; involucre bracts 8–12 mm. long, narrow, linear-subulate, rarely broader, often with a dark, thickened dorsal rib, margins subscarios, rarely black-tipped or at most minutely so; rays distinctly yellow.

From Inyo County, California, northward through the Sierra Nevada, in the Siskiyou region extending just barely into Oregon, and in the northern Coast Range of California. Most abundant in open forested areas at middle and high elevations. Map 3 (triangles).

Representative material:

CALIFORNIA. Humboldt Co.: Hupa Indian Reservation, Chandler 1274 (GH, MO, NY, UC). Nevada Co.: Castle Peak, Heller 7068 (GH, MO, PH, WTU). Placer Co.: Cisco, Heller 12691 (GH, MO, MONT, NY, PH, UC).



Map 6. *Senecio integerrimus* var. *exaltatus*.

Tuolumne Co.: Dardanelle, *Alexander & Kellogg 3758* (GH, MO, UC). OREGON. Jackson Co.: near Ashland Peak, *Whittaker 239* (WS).

There are many unicates of var. *major* in the University of California Herbarium. The majority of specimens were collected more than thirty years ago.

In the southern end of its range in the Sierra Nevada, extreme specimens of this variety intergrade with extremes of *S. aronicoides*. Whether or not there is any interbreeding between the two is yet to be determined.

5f. *SENECIO INTEGERRIMUS* var. *EXALTATUS* (Nutt.) Cronq., *Leaff. West. Bot.* 6:48 (1950). *S. exaltatus* Nutt., *Trans. Amer. Phil. Soc. II.* 7:410 (1841). *S. lugens* var. *exaltatus* D. C. Eaton, *Bot. King Exped.* 188 (1871). [This combination also made by A. Gray, *Bot. Calif.* 1:413 (1876).] Type coll.: Nuttall, "plains of Oregon, near the outlet of the Wahlamet" (not seen).

S. Hookeri Torrey & Gray, *Flora N. Amer.* 2:438 (1843). Type coll.: Drummond, Rocky Mts., Lat. 52° (not seen).

S. lugens var. *Parryi* D. C. Eaton, *Bot. King Exped.* 177 (1871). Type coll.: Watson 662, E. Humboldt Mts. (NY!).

S. columbianus Greene, *Pittonia* 3:170 (1897). *S. atriapiculatus* Rydb., *Mem. N. Y. Bot. Gard.* 1:442 (1900). Dawson, Guichon Creek, B. C., July, 1888, may represent the type collection (UC!).

S. condensatus Greene, *Pittonia* 3:298 (1898). Type coll.: Piper, Blue Mts., Walla Walla Co., Washington. (*Piper 2434*, which may represent this collection, GH!, WS!).

S. perplexus A. Nelson, *Bull. Torr. Bot. Club* 27:272 (1900). Type coll.: Nelson 128, Pole Creek, Wyoming (NY!, lectotype).

S. dispar A. Nelson, *Bull. Torr. Bot. Club* 27:272 (1900). *S. perplexus* var. *dispar* (A. Nelson) A. Nelson, in Coulter & Nelson, *New Man. of Bot. of Rocky Mts.* 580 (1902). Type coll.: Nelson 3232, Green Top, Wyoming (not seen). Paratype, Nelson 5754, Yellowstone Park (US!).

S. arachnoideus Rydb., *Mem. N. Y. Bot. Gard.* 1:442 (1900). Type coll.: Kelsey, Deer Lodge, Montana (NY!).

S. solitarius Rydb., *Mem. N. Y. Bot. Gard.* 1:444 (1900). Type coll.: Tweedy 813, Yellowstone Park. Perhaps a misprint for *Tweedy 713*, in *Herb. N. Y.* with Rydberg's handwriting, which agrees with the original description (NY!) (a monocephalous form).

S. Flintii Rydb., *Bull. Torr. Bot. Club* 33:157 (1906). Type coll.: Flint, southwestern Colorado (NY!).

Herbage pubescent with long, jointed hairs, seldom glabrate: basal leaves oblanceolate to elliptic, rarely subcordate as in var. *ochroleucus*: inflorescence varying from densely congested to open and loose, terminal head usually on a shortened peduncle; involucre bracts greatly variable in shape, black-tipped; rays yellow.

From Tulare County, California, north through the Sierra Nevada and Cascade Mountains to British Columbia, and east to the eastern limits of the Rocky Mountains. Present in open forests and prairies from the lower foothills to timberline, abundant and widespread. Map 6.

Representative material:

ALBERTA. West of Bertha Lake, *Breitung* 17494 (NY, UC). BRITISH COLUMBIA. Sophie Mtn., *Macoun* 64995 (GH, NY). Near Lake Boolahnne, *Thompson & Thompson* 124 (NY, UC, WTU). CALIFORNIA. Mono Co.: Deep Creek, *Alexander & Kellogg* 4033 (GH, MO, NY, UC). Tuolumne Co.: Mt. Dana, *Sharsmith* 2055 (CAS, NY, PH, UC, WS). COLORADO. Chaffee Co.: Grizzly Peak, *Clokey* 3442 (GH, NY, UC). Larimer Co.: Beaver Creek, *Goodding* 1439 (PH, NY, UC). IDAHO. Blaine Co.: Norton Peak, *Hitchcock & Muhlick* 10693 (CAS, GH, MONT, NY, UC, WS, WTU). Boise Co.: Squaw Creek, *Macbride* 846 (GH, ID, MONT, NY, UC, WS). Custer Co.: Oyler Ranch, *Hitchcock & Muhlick* 9372 (CAS, GH, MONT, NY, RM, UC, WS, WTU). MONTANA. Beaverhead Co.: Oreamnos, *Hitchcock & Muhlick* 12756 (NY, PH, RM, WS, WTU). Flathead Co.: Columbia Falls, *Rogers & Rogers* 926 (NY, WS). NEVADA. Elko Co.: near Deeth, *Heller* 9178 (MO, NY, PH). Esmeralda Co.: Chiatovitch Creek, *Duran* 3063 (GH, NY, ORE, UC, WS, WTU). Nye Co.: Cherry Creek, *Maguire & Holmgren* 25431 (CAS, GH, NY, OSC, UC, WS, WTU). NEW MEXICO. Colfax Co.: Johnson Mesa, *Swan* 13190 (RM). OREGON. Crook Co.: Bear Buttes, *Leiberg* 333 (MO, NY, ORE). Harney Co.: Steens Mtn., *Barkley* 114 (undistributed). Jackson Co.: northeast of Butler Butte, *Kruckeberg* 2011 (ID, NY, R, UC, WS). UTAH. Cache Co.: Smithfield Sugar Factory, *Muenschner* 2457 (GH, UC). Daggett Co.: Untiah Mts., *Williams* 562 (GH, MONT, NY, WTU). WASHINGTON. Chelan Co.: *Kruckeberg* 2655 (ID, NY, UC, WS). Grant Co.: west of Coulee City, *Gaines & Schaeffer* 362 (GH, NY, UC, WS). Lincoln Co.: mouth of Spokane River, *Rogers* 391 (CAS, GH, MO, NY, UC, WS, WTU). WYOMING. Albany Co.: west of Laramie, *Porter* 3538 (GH, RM, UC, WTU). Carbon Co.: Hanna, *Payson & Payson* 1682 (GH, NY).

At high elevations, often growing close to melting snow, var. *exaltatus* is dwarfed, densely pubescent, and with close heads. The name *S. condensatus* Greene was applied to this alpine phase. Studies in both the herbarium and field indicate that the alpine phase intergrades completely with the more typical and common phase of lower elevations, and is simply the extreme of a continuous series. On Steens Mountain, Harney County, Oregon, var. *exaltatus* ranges from the typical phase at the base (el. about 4500 ft.) to the dwarfed alpine phase at Fish Lake (el. about 7000 ft.) with a series of morphological intermediates occurring at intermediate elevations. The distance, by road, between the two extremes is about 20 miles.

The name *S. lugens* var. *Hookeri* D. C. Eaton (Bot. King Exped. 188,—1871) is not based upon *S. Hookeri* T. & G., but rather upon several collections, including *Watson* 661. The latter is itself a mixture, containing some specimens which are referable to *S. sphaerocephalus* Greene. In any case, the name falls into synonymy, so for the purpose of stabilizing nomen-

clature I am designating as a lectotype the Torrey Herbarium specimen of *Watson 661*, which is deposited in the New York Botanical Garden Herbarium. It was collected at 8000 feet elevation in the Uintas, Utah, in July, 1869, and it is properly placed in *S. sphaerocephalus* Greene.

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NEW OR NOTABLE WEEDS FROM OREGON

BY ROBERT ORNDUFF

University of California, Berkeley

During a recent collecting trip in northwestern Oregon, I gave special attention to the introduced flora and as a result several new records were obtained which are reported here. Duplicates of these collections are deposited at Oregon State College, University of Washington, and University of California.

Melandrium rubrum (Weig.) Garcke is known in Oregon only from one small colony near Crown Point, Multnomah County (see H. G. Baker in *Madroño* 10:218-221). Although this colony has now been known for a number of years and produces abundant seed, it has not spread from what appears to be its point of introduction. There is some evidence that it was introduced intentionally, since it grows with the ornamental *Dianthus barbatus* L., and nearby at Crown Point additional highly localized cultigens persist.

Cardaria pubescens (C. A. Mey.) Roll. var. *elongata* Roll. is widespread in the arid eastern portions of both Oregon and Washington but appears to be unrecorded from the western parts of these states. A large, freely seeding colony was noted at

the site of the wartime Vanport housing project between Force Lake and North Portland Road, Multnomah County.

Kentranthus ruber (L.) DC. is naturalized in several areas in California but apparently it has been unreported from the Pacific Northwest. It is cultivated in rockeries in the vicinity of Portland and has been noted as a frequent escape there into adjacent areas.

Campanula persicifolia L., and to a lesser extent *C. Medium* L., are naturalized in wooded areas in and around Portland. These species, as well as the more widespread *C. rapunculoides* L., have undoubtedly spread from gardens where they are grown as ornamentals. *Campanula Medium* may be distinguished at once by its five rather than three stigmas, its hispid foliage, and its appendaged calyx. *Campanula persicifolia* is somewhat similar to *C. rapunculoides* but differs by its narrower, linear-lanceolate middle cauline leaves and by its larger, suberect rather than nodding flowers.

Centaurea montana L. is a European composite that has gone unrecorded from the Pacific Northwest although it is naturalized in and near Portland, as well as along U. S. Highway 101 in Clatsop County, and in the vicinity of Brightwood, Clackamas County. Unlike the other members of the genus in Oregon, this species grows in rather moist, partially shaded situations. It appears occasionally in gardens, where it is more likely tolerated than encouraged.

A distinctive, yellow-flowered species of *Hieracium* is exceedingly abundant on Council Crest in Portland and is rapidly spreading in the hills west of the city. It defies precise identification, but seems to fall into the Euvulgate section of the genus somewhere near the European *H. vulgatum* (Fr.) Almq.

SUBTERRANEAN CLOVER IN CALIFORNIA AND OREGON. One of the plants that has been introduced into California pastures from the Old World is *Trifolium subterraneum* L., but to the present, Humboldt, Sonoma, and Santa Cruz counties are the only counties from which I have seen records indicating that it has become established: bed of Price Creek, near mouth, Weymouth, Humboldt Co., S. K. Harris in 1960; Matthaie Ranch, 2 miles southeast of Sonoma, Sonoma Co., Howell 30147 in 1955; along a disused road in oak woodland near Sonoma,

Sonoma Co., *A. B. Barbour in 1960*; Rancho del Oso, near Waddell Creek about 1.5 miles from the coast, Santa Cruz Co., *J. H. Thomas 8593*. There is also a collection from the Kehler Ranch, 6.5 miles east of Oroville, Butte Co., *Robert Kehler in 1951*, but I have not been able to determine whether the specimens had been cultivated or not. The only other American specimen I have seen of *T. subterraneum* is one from Oregon: *W. H. Baker 5281*, collected in "open field at Camp Adair about 6 miles north of Corvallis, Benton Co." In 1955, Ernest C. Twisselmann made collections on a test plot in Kings Co., and noted under his *No. 1690* (7 miles south of Kettleman City, Kings Co.), "not established." Mr. Twisselmann listed the subterranean clover in his "Flora of the Temblor Range and neighboring part of the San Joaquin Valley" (*Wasmann Journ. Biol.* 14:247,—1956) but indicated that it was not an established species in his area. F. J. Hermann (in "A botanical synopsis of the cultivated clovers," *Agriculture Monograph No. 22*, p. 29,—1953) did not note any naturalized occurrence for the subterranean clover in North America.

The subterranean clover when in flower may be distinguished from other annual species in the western United States by its non-involucrate head of 2 to 5 fertile flowers that become abruptly deflexed on their very short pedicels after anthesis. At that time numerous sterile flowers develop enclosing the fertile ones in a bur-like cluster that buries itself in the soil as it matures. This remarkable clover is native in the Old World and is widely distributed from western and southern Europe to north Africa and Iran.—JOHN THOMAS HOWELL.

A RECORD OF *ELEOCHARIS PARVULA* IN THE SAN FRANCISCO BAY AREA. *Eleocharis parvula* (Roem. & Schult.) Link is a small semi-cosmopolitan spike-rush of salt marshes and has heretofore been reported in California only from San Luis Obispo and Humboldt counties (Mason, *A Flora of the Marshes of California*, 1957; Munz and Keck, *A California Flora*, 1959). It has also been collected by Peter H. Raven in the San Francisco Bay area: tidal wash, Dutton Landing, Napa Co., Oct. 4, 1953, his *No. 6367* (CAS). This station is located about halfway between the two previously reported, widely separated areas for this plant in California.—PETER RUBTZOFF.

BERBERIS PUMILA ON IRON MOUNTAIN, OREGON. William H. Baker, in his *Plants of Iron Mountain, Rogue River Range, Oregon* (*The American Midland Naturalist* 56:1–53,—1956), lists 60 species that reach their northern limits on Iron Mountain or extend only a short distance north of it. In June, 1959, I found *Berberis pumila* Greene on the east slope of Iron Mountain just below the south saddle near the summit. It was growing in a relatively small area on and near the road which at that time appeared impassable. *Berberis piperiana* (Abrams) Peck, a common species in this region, occurred in this same general area. Since *B. pumila* previously has not been reported from north of the Rogue River, this is a northern extension of its range and an addition to the number of species that reach their northern limits in the Iron Mountain region. A specimen has been deposited in the Herbarium at the University of Illinois.—J. W. GERDEMANN, Department of Plant Pathology, University of Illinois, Urbana.

RHAGADIOLUS EDULIS IN CALIFORNIA. In June, 1958, Mrs. Ida DeMay Wilson of Napa, California, collected *Rhagadiolus edulis* Gaertn. (*Compositae*, tribe *Cichorieae*) along the Dry Creek Road near Napa. This is apparently the first record for a species of this Mediterranean genus from North America. It may be readily distinguished from other Californian members of the tribe by its lack of pappus, cauline leaves, yellow flowers, and, most conspicuously, by its two-ranked involucre bracts, the outer series consisting of 5 small scale-like bracts, the inner consisting of 5 to 8 cylindrical scales which are persistent, become indurate and enlarged, and surround the awl-shaped, somewhat compressed achenes at maturity. Mrs. Wilson's notes on the locality are as follows: "The only place I have seen it is on our property, where it is growing abundantly in the shade of blue oaks, live oaks, white oaks, walnuts, and other large trees near the creeks. It was here when we came about five years ago. The exact location is: California Napa Quadrangle, Sec. 31, Twp. 7 N. R 5 W." (from letter of Dec. 20, 1958). Thus another interesting Mediterranean plant is to be added to the flora of California. Her specimen is deposited in the herbarium of the University of California, Los Angeles.—PETER H. RAVEN, University of California, Los Angeles.

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LEAFLETS *of* WESTERN BOTANY

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A STATISTICAL REPORT ON A CALIFORNIA FLORA

BY GLADYS L. SMITH AND ANITA M. NOLDEKE

In preparing the present statistical report, a page by page, species by species count was made of those plants listed in *A California Flora*¹ by Philip A. Munz and David D. Keck (1959). We prepared our counts independently and then compared the totals. By using such a method the report is believed to be accurate and complete insofar as the incident of error will allow.

In 1956 a similar summary was made² based on *A Manual of the Flowering Plants of California*³ by W. L. Jepson (1923-1925). A comparison between the statistical record of the flora of California as represented then and the record as it stands today, more than 30 years later, should be not only botanically interesting but valuable as well in revealing ecological trends of weedy and naturalized plants. Can such trends, if they exist, be correlated to the growths in population and suburban development and to the corresponding reduction and disappearance of untouched native habitats? There is no doubt that much of the change that is reflected by the statistics has occurred because of increased taxonomic and geographic knowledge of the plants concerned, particularly as the taxonomy has been influenced by genetic studies on indigenous plants. Nevertheless, the unprecedented industrial and suburban development of our state in the past 25 years has undoubtedly contributed in large measure to the changes in statistical records between Jepson's time and the Munz and Keck publication in 1959.

In preparing a flora of such large scope it is understandable that the authors could not give time for exhaustive studies on all plant determinations. This led to indecisive treatment of a number of plant names which in turn has caused uncertainty in making a precise statistical count. An explanation therefore seems called for as to how plants have been tabulated in this report.

¹ *A California Flora* by Philip A. Munz and David D. Keck. University of California Press, Berkeley and Los Angeles, California, 1959.

² A numerical summary of the vascular plants of California by Lillian Herriott and Anita M. Noldeke. *Leaflet West. Bot.* 8: 58, 59 (1956).

³ *A Manual of the Flowering Plants of California* by Willis Linn Jepson. University of California Press, Berkeley and Los Angeles, California, 1923-1925.

The report follows the treatment according to Munz and Keck. Thus, five major divisions are recognized rather than the usual two of *Pteridophyta* and *Spermatophyta* as in Engler and Prantl⁴. Genera and species, both numbered and unnumbered, appearing in bold-face type have been tabulated as they appear in the book under these categories. Some difficulty was encountered, however, in determining whether a species was native or introduced. For the most part, the word "weedy" appeared to refer to non-native plants. It was soon found, however, that this word was also used to describe the rank growth pattern of some native plants. Since the word "introduced" was often omitted in the description of non-native plants, a decision as to the status of such plants has been made as follows: in instances where a plant was described as "weedy" and strong doubt was felt by us that it was a native plant, other authors have been consulted and where decisions could be found, the plant has been tabulated accordingly. In many instances the only solution was to make a decision unaided on the basis of interpretation of the text. In such cases there will undoubtedly be disagreement in proportion to the reader's knowledge of the plant concerned. In support of decisions made for this report, it can be said that every effort has been made to be completely impartial and personal experience and feelings have not been allowed to influence our decisions. A few examples are cited to illustrate this problem: *Physalis lanceifolia* Nees (p. 595), "Occasional weed in cultivated fields . . ." has been counted as an introduced plant. *Datura meteloides* A. DC. (p. 601), doubtfully described as "Possibly introduced from Mexico," has been counted as introduced. *Parentucellia viscosa* (L.) Caruel (p. 658) is described as a "Roadside weed. . . ." Jepson (p. 948) states that this plant is introduced, and in this report both the genus and species have been counted as introduced.

In instances where a plant is represented by only one or more varieties, the first-named variety has been counted as species representation for that plant. Varietal names appearing in bold print, unnumbered, are usually clear-cut and tabulation in this category has been relatively simple. All plants with infraspecific status (forms, varieties, and subspecies) have been counted under the one category of varieties, separation having been made only on a native or introduced basis.

⁴ Die Natürlichen Pflanzenfamilien by A. Engler and K. Prantl. Duncker and Humblot, Berlin.

Plants apparently of hybrid derivation have been tabulated as species when they receive a specific number and when they appear in bold print in an indented paragraph. Examples may be found on pages 636 and 657, No. 29. **Penstemon** × **Parishii**, and No. 2. **Hebe** × **franciscana** (Eastw.) Souster, and on page 976, **C. [eanothus]** × **Lorenzenii** (Jeps.) McMinn. Hybrid plants referred to within a paragraph discussion, either in bold print or italics (p. 904), **Q. [uercus]** × **Ganderi** C. B. Wolf, and p. 905 **Q. [uercus]** × **Eplingii** C. H. Mull., have been counted as indefinite forms. References to named hybrids have been totalled for a final count of recognized hybrids.

Plant names appearing in italics and mentioned in paragraphs describing other varieties or species have been considered by us as not recognized as stable entities by Munz and Keck. Such plants have been tabulated under the heading "Indefinite Forms."

The statistical report that follows includes a detailed count by families arranged alphabetically within the larger groups, a summarized count by major and minor groups, and a chart showing comparative figures and percentage increases between the 1956 statistical report based on Jepson's Manual and the present flora by Munz and Keck. The complete work sheets from which these totals have been taken are on file in the Botany Department of the California Academy of Sciences.

FAMILIES	GENERA		SPECIES		VARIETIES		INDEFINITE FORMS	
	Native	Introd. Advent. Natlzd.	Native	Introd. Advent. Natlzd.	Native	Introd. Advent. Natlzd.	Native	Introd. Advent. Natlzd.
DIVISION I. LEPIDOPHYTA								
Isoetaceae	1	..	6(1)*	..	1(1)	..	..	..
Lycopodiaceae	1	..	1	..	..	..	..	..
Selaginellaceae	1	..	11(3)	..	..	..	..	..
DIVISION II. CALAMOPHYTA								
Equisetaceae	1	..	6	..	1	..	..	..
DIVISION III. PTEROPHYTA								
Aspidiaceae	6	..	16(2)	..	4(2)	..	..	..
Aspleniaceae	1	..	2	..	..	..	..	..
Blechnaceae	2	..	2	..	..	..	..	..
Marsileaceae	2	..	3	..	..	..	..	..
Ophioglossaceae	2	..	5	..	1	..	2	..
Polypodiaceae	1	..	4	..	..	..	1	..
Pteridaceae	9	..	28(6)	..	5(3)	..	1(1)	..
Salviniaceae	1	..	1	..	..	..	1	..

* Figures in parentheses give numbers of endemics. See article following this table for explanation and summary.

FAMILIES	GENERA		SPECIES		VARIETIES		INDEFINITE FORMS	
	Native	Introd. Advent. Natlzd.	Native	Introd. Advent. Natlzd.	Native	Introd. Advent. Natlzd.	Native	Introd. Advent. Natlzd.
DIVISION IV. CONIFEROPHYTA								
Cupressaceae	5	..	18(11)	..	1(1)	..	..	..
Ephedraceae	1	..	7	..	1(1)	..	..	..
Pinaceae	5	..	32(8)	..	1	..	2(1)	..
Taxaceae	2	..	2(1)	..	..	..	..	..
Taxodiaceae	2(1)	..	2(1)	..	..	..	..	..
DIVISION V. ANTHOPHYTA								
CLASS I. DICOTYLEDONEAE								
Acanthaceae	1	..	1	..	..	..	..	..
Aceraceae	1	..	4	..	2(2)	..	..	..
Aizoaceae	3	4	3	13	..	..	..	..
Amaranthaceae	2	1	7	8	..	..	..	..
Anacardiaceae	1	1	6	1	2(1)	..	2	..
Apocynaceae	3	1	8(1)	1	4(3)	..	3	..
Araliaceae	1	1	1	1	..	..	..	..
Aristolochiaceae	2	..	4(2)	..	..	..	..	..
Asclepiadaceae	4	..	17(2)	1	1(1)	..	4(3)	..
Batidaceae	1	..	1	..	..	..	..	..
Berberidaceae	3	..	17(4)	..	1(1)	..	..	..
Betulaceae	3	..	7	..	..	..	3(2)	..
Bignoniaceae	1	..	1	..	..	..	1	..
Boraginaceae	13	3	145(49)	11	33(20)	..	4(4)	..
Burseraceae	1	..	1	..	..	..	..	..
Buxaceae	1	..	1	..	..	..	..	..
Cactaceae	5	..	34(3)	2	14(10)	..	2	..
Callitrichaceae	1	..	6(2)	..	1	..	..	..
Calycanthaceae	1	..	1(1)	..	..	..	..	..
Campanulaceae	10(2)	..	46(20)	..	9(5)	..	4(2)	..
Capparidaceae	6	..	13	..	4(4)	..	2(1)	..
Caprifoliaceae	5	..	22(2)	1	2(2)	..	4(2)	..
Caryophyllaceae	11	11	64(11)	29	30(20)	..	6(1)	..
Celastraceae	4	..	6	..	1(2)	..	1	..
Ceratophyllaceae	1	..	1	..	..	..	..	..
Chenopodiaceae	12	5	62(8)	20	16(8)	2	3	1
Cistaceae	1	1	3(2)	1	2(1)	..	..	..
Compositae	141(12)	38	696(217)	126	240(145)	1	50(20)	3
Convolvulaceae	3	1	16(6)	6	11(10)	1	..	..
Cornaceae	1	..	7(1)	..	..	..	..	..
Crassulaceae	5(2)	1	40(19)	2	17(12)	..	4(2)	..
Crossosomataceae	1	..	2	..	..	..	..	..
Cruciferae	32(1)	21	172(56)	55	86(52)	6	5(1)	..
Cucurbitaceae	3	1	8(3)	2	2(2)	..	1	..
Cuscutaceae	1	..	14(2)	2	5(5)	..	..	..
Datiscaceae	1	..	1	..	..	..	..	..
Dipsacaceae	..	2	..	4	..	..	..	..
Droseraceae	1	..	2	..	..	..	..	..
Elaeagnaceae	1	1	1	1	..	..	..	..
Elatinaceae	2	..	7(1)	1	..	..	1(1)	..
Empetraceae	1	..	1	..	..	..	..	..
Ericaceae	13	..	67(30)	..	30(29)	..	6(5)	..
Euphorbiaceae	9	2	41(4)	10	6(3)	..	..	..

FAMILIES	GENERA		SPECIES		VARIETIES		INDEFINITE FORMS	
	Native	Introd. Advent. Natldz.	Native	Introd. Advent. Natldz.	Native	Introd. Advent. Natldz.	Native	Introd. Advent. Natldz.
Fagaceae	3	..	20(5)	..	7(5)	..	18(10)	..
Fouquieriaceae	1	..	1	..	..	..	..	..
Frankeniaceae	1	..	2	..	1	..	..	..
Fumariaceae	2	1	7(3)	2	2(2)	..	..	..
Garryaceae	1	..	6(1)	..	(1)	..	..	..
Gentianaceae	7	..	32(7)	1	3(1)	..	2	..
Geraniaceae	2	1	11(3)	22	..	..	2(1)	..
Haloragaceae	2	..	5	..	..	..	..	..
Hippocastanaceae	1	..	1(1)	..	..	..	..	..
Hydrophyllaceae	14(1)	..	130(39)	..	39(24)	..	13(10)	..
Hypericaceae	1	..	3(1)	2	..	..	..	..
Juglandaceae	1	..	2(2)	..	..	..	..	..
Krameriaceae	1	..	2	..	1	..	..	..
Labiatae	19	11	95(47)	20	32(20)	..	11(4)	..
Lauraceae	1	..	1	..	1(1)	..	..	..
Leguminosae	23(1)	12	309(108)	63	146(98)	4	46(26)	3
Lennoaceae	2	..	2	..	..	..	1	..
Lentibulariaceae	2	..	6	..	..	..	..	..
Limnanthaceae	2	..	8(5)	..	4(4)	..	..	..
Linaceae	1	..	12(9)	3	..	..	..	..
Loasaceae	4	..	25(6)	..	4(3)	..	..	..
Loranthaceae	2	..	7	..	10	..	2	..
Lythraceae	3	1	5	2	..	..	2	..
Malvaceae	10	4	60(32)	14	31(20)	1	2(1)	..
Martyniaceae	1	1	2	2	..	..	..	..
Meliaceae	..	1	..	1	..	..	..	..
Moraceae	..	2	..	2	..	..	..	..
Myricaceae	1	..	2(1)	..	..	..	..	..
Myrtaceae	..	1	..	3	..	..	..	..
Nyctaginaceae	8	..	28(2)	3	9(6)	..	3(1)	..
Nymphaeaceae	2	..	2	..	..	..	..	..
Oleaceae	3	..	8(1)	..	..	..	..	..
Onagraceae	10(1)	1	110(32)	10	63(32)	2	21(3)	2
Orobanchaceae	2	..	11(2)	1	12(5)	..	..	..
Oxalidaceae	1	..	5(1)	6	..	..	1(1)	1
Paeoniaceae	1	..	2(1)	..	..	..	..	..
Papaveraceae	10	2	23(9)	6	12(10)	..	6(5)	..
Phytolaccaceae	..	1	..	1	..	..	..	..
Plantaginaceae	1	..	10	6	3(1)	2	..	1
Platanaceae	1	..	1	..	..	..	..	..
Plumbaginaceae	2	..	2	2	1(1)	..	..	..
Polemoniaceae	13	..	160(59)	..	74(54)	..	7(6)	..
Polygalaceae	1	..	4	..	3(2)	..	..	..
Polygonaceae	10(2)	2	169(65)	20	79(52)	1	25(11)	1
Portulacaceae	6	..	44(12)	1	21(11)	..	..	..
Primulaceae	8	1	18(3)	2	8(5)	..	..	..
Pyrolaceae	10	..	15	..	3	..	..	..
Rafflesiaceae	1	..	1	..	..	..	..	..
Ranunculaceae	13	..	81(26)	9	48(23)	2	20(13)	..
Resedaceae	1	1	1	4	..	..	..	..
Rhamnaceae	5	..	61(29)	..	32(25)	..	6(5)	..
Rosaceae	36(1)	1	129(31)	19	54(29)	..	19(7)	1

FAMILIES	GENERA		SPECIES		VARIETIES		INDEFINITE FORMS	
	Native	Introd. Advent. Natlzd.	Native	Introd. Advent. Natlzd.	Native	Introd. Advent. Natlzd.	Native	Introd. Advent. Natlzd.
Rubiaceae	3	1	33(10)	8	12(10)	..	1	..
Rutaceae	3	1	3(1)	2	..	..	..	..
Salicaceae	2	..	35(4)	1	17(1)	..	6(4)	..
Santalaceae	1	..	1	..	..	..	..	..
Sarraceniaceae	1	..	1	..	..	..	..	..
Saururaceae	1	..	1	..	..	..	..	..
Saxifragaceae	20(1)	..	98(30)	1	23(20)	..	14(11)	..
Scrophulariaceae	21	8	280(115)	27	88(68)	..	15(9)	..
Simarubaceae	1	1	1	1	..	..	..	..
Solanaceae	8	2	30(2)	30	9(10)	1	1(1)	..
Staphyleaceae	1	..	1(1)	..	..	..	..	..
Sterculiaceae	2	..	3(1)	..	3(3)	..	3(3)	..
Styracaceae	1	..	1	..	1(2)	..	..	..
Tamaricaceae	..	1	..	4	..	..	..	..
Thymelaeaceae	1	..	1(1)	..	..	..	..	..
Tropaeolaceae	..	1	..	1	..	..	..	..
Ulmaceae	1	1	1	2	..	..	..	..
Umbelliferae	30(1)	11	119(37)	17	15(7)	..	1(1)	..
Urticaceae	3	..	7(2)	2	..	..	..	..
Valerianaceae	2	2	14(4)	3	10(4)	..	..	..
Verbenaceae	2	..	10	5	..	2	2(2)	..
Violaceae	1	..	21(2)	2	15(6)	..	2(1)	..
Vitaceae	1	..	2	1	..	..	..	..
Zygophyllaceae	3	2	5	2	1	..	..	..

DIVISION V. ANTHOPHYTA

CLASS II. MONOCOTYLEDONEAE

Agavaceae	3	..	10(2)	..	8(7)	..	..	..
Alismataceae	4	..	9(1)	..	1	..	..	..
Amoryllidaceae	5	..	73(35)	..	29(24)	..	6(6)	..
Araceae	2	2	2	2	..	..	..	..
Commelinaceae	..	1	..	1	..	..	..	..
Cyperaceae	11	1	189(23)	13	13(3)	..	1(1)	..
Eriocaulaceae	..	1	..	1	..	..	..	..
Gramineae	56(2)	40	309(49)	140	30(11)	4	34(8)	4
Hydrocharitaceae	1	..	2	1	..	..	..	..
Iridaceae	2	2	19(8)	2	4(6)	..	6(4)	..
Juncaceae	2	..	56(8)	1	10(1)	..	1	..
Juncaginaceae	1	..	4	..	1	..	..	..
Lilaceae	1	..	1	..	..	..	..	..
Liliaceae	24(1)	1	121(56)	1	24(21)	..	4(4)	..
Lemnaceae	4	..	11	..	1	..	2	..
Najadaceae	1	..	3	1	..	..	..	..
Orchidaceae	10	..	22	..	2	..	..	..
Palmae	1	..	1	..	..	..	..	..
Pontederiaceae	1	2	1	2	..	..	..	..
Potamogetonaceae	1	..	18	1	2	..	3	..
Ruppiaceae	1	..	2	..	..	..	2	..
Scheuchzeriaceae	1	..	1	..	..	..	..	..
Sparganiaceae	1	..	4	..	..	..	1	..
Typhaceae	1	..	4	..	..	..	..	..
Zannichelliaceae	1	..	1	..	..	..	..	..
Zosteraceae	2	..	3	..	1	..	..	..

SUMMARY

(The figures in parentheses indicate introduced taxa in each category)

DIVISIONS AND CLASSES	FAMILIES	GENERA	SPECIES	VARIETIES	INDEFINITE FORMS
Lepidophyta	3	3	18	1	..
Calamophyta	1	1	6	1	..
Pterophyta	8	24	61	10	5
Coniferophyta	5	15	61	3	2
Anthophyta					
Dicotyledoneae	119(7)	845(170)	4499(634)	1441(25)	372(13)
Monocotyledoneae	26(2)	187(50)	1030(166)	130(4)	64(4)
Totals:	162(9)	1075(220)	5675(800)	1586(29)	443(17)

Total number of plants (species, varieties, indefinite forms described or mentioned, excluding synonyms)	Total named hybrids (appearing in the above count under species)
Native 6858	Native 17
Introduced 846	Introduced 3
Total 7704	Total 20

Number of species in the 6 largest families:	Number of species in the 6 largest genera:
Compositae 822	Carex 144
Gramineae 449	Astragalus 93
Leguminosae 372	Phacelia 87
Scrophulariaceae 307	Lupinus 82
Cruciferae 227	Eriogonum 77
Cyperaceae 202	Mimulus 77
(Liliaceae would also number 202 species if treated in the traditional manner.)	

PERCENTAGE INCREASE BETWEEN JEPSON'S MANUAL AND MUNZ AND KECK'S FLORA

Genera	16% increase
Species	37.66% increase
Introduced, adventive, and naturalized plants..	156.66% increase

6% of total flora represented by non-native plants in Jepson's Manual

11% of total flora represented by non-native plants in Munz and Keck's Flora

ENDEMISM AND A CALIFORNIA FLORA

BY ANITA M. NOLDEKE AND JOHN THOMAS HOWELL

In the preceding statistical enumeration (1) of the plants in A California Flora (2), the figures given in parentheses throughout the table refer to the number of endemics occurring in the various taxa of any particular family. These figures were first assembled by the senior author and were subsequently checked in an independent count by the junior author, so it is believed that they closely approximate the number of California endemics as presented in the work of Munz and Keck.

The count of endemics is given for California as a state, not as a floral province, and we have relied almost entirely on the distributional data given by Munz and Keck. In a few instances, however, we have not followed the printed word if there is something intrinsic in the name or authorship of the plant that indicated to us that the plant was not endemic. Thus *Arabis microphylla* Nuttall (p. 262) and *Polygonum patulum* Bieberstein (p. 362) are not counted as endemics since in both instances the authors of the plant names suggested to us a distribution beyond the borders of California, although the incomplete distributional data given by Munz and Keck would indicate endemism. We may have overlooked other matters of this sort in our count of endemics but we believe that such slips are very few because the completeness and accuracy of distributional data given by Munz and Keck are one of the outstanding attributes of the work.

The method of calculating endemism of varieties is easy enough if the species (*i.e.*, the typical variety) extends beyond California and one or more of the varieties are endemic. If, however, the species (*i.e.*, the typical variety) is endemic and one of the varieties ranges beyond the state line, then we have counted the species (*i.e.*, the typical variety) as an endemic variety. Thus *Eriophyllum staechadifolium* Lag. (p. 1149) is counted as an endemic variety (*i.e.*, as var. *staechadifolium*) because the var. *artemisiaefolium* (Less.) Macbr. reaches a northern distributional limit on the central Oregon coast.

A rare but interesting situation arises when, because of this way of evaluating typical varieties, an endemic variety is indicated in the table where no variety (or a smaller number of varieties) is given by Smith and Noldeke in their floristic tabu-

lation. An example of this is found in *Garryaceae*. *Garrya flavescens* Wats., represented in California only by var. *pallida* (Eastw.) Bacigalupi, is counted as a species in the floristic enumeration. When viewed as an endemic, however, this California plant is counted not as a species (since *G. flavescens* var. *flavescens* ranges as far as Texas and northern Mexico), but as a variety. Hence, in the table under *Garryaceae*, *G. flavescens* var. *pallida* accounts for the single varietal endemic listed as "(1)", with no other varietal numeral given.

This manner of counting endemic varieties when the entire species is not endemic has been closely adhered to in preparing our count of endemic varieties.

ENDEMIC GENERA

The genera treated as endemic by Munz and Keck total 29 or 3.39% of the native genera. These endemics are as follows:

SEQUOIADENDRON	HETEROGAURA	MONOLOPIA
TROPIDOCARPUM	OREONANA	PSEUDOBABIA
GILMANIA	PARISHELLA	OROCHAENACTIS
HOLLISTERIA	LEGENERA	BENITOA
DRAPERIA	EASTWOODIA	TRACYINA
PARVISEDUM	HOLOZONIA	PHALACROSERIS
CONGDONIA	HOLOCARPHA	ODONTOSTOMUM
CARPENTERIA	BLEPHARIZONIA	ECTOSPERMA
LYONOTHAMNUS	WHITNEYA	NEOSTAPFIA
PICKERINGIA	CROCKERIA	

(The monotypic grass genus *Scribneria* is given as strictly Californian (p. 1510), whereas it ranges through the Cascades in Oregon into southern Washington.)

It is interesting that the total number here is exactly the same as the number of genera treated as endemic by Jepson (3) as "adjusted" by the junior author (4). In a subsequent paper the junior author (5) proposed a list of genera endemic to a California floral province. According to distributional data accompanying that list, *Tropidocarpum* and *Pickeringia* range to northern Baja California, *Heterogaura* reaches southwestern Oregon, and the genus *Congdonia* is omitted as a dubiously based proposal (cf. Moran, Leaflet West. Bot. 6: 62, 63,—1950). If these are subtracted from the Munz and Keck figure, there remain only 25 genera endemic to California.

ENDEMIC SPECIES

The endemic species total 1414 or 29.02% of the native flora in the Munz and Keck work. This is a considerable reduction in state endemism when compared to the figures deduced from an analysis of Jepson's Manual. Those figures (6) give a total of 1440 endemic species out of 3740 native species, or 38.50%. The fuller, more accurate distributional data given by Munz and Keck undoubtedly give a more correct and realistic picture of endemism within the state: it is notably high but not so impressive.

If, however, the problem is approached from the point of view of a California floral province, then undoubtedly the high percentage of endemics given by Jepson will again be equaled or perhaps surpassed. In a recent study in endemism in California ferns and fern allies (7), it is pointed out that although only 15.30% of the species are endemic within the state, 27.55% are endemic to a California floral province. Future studies will be necessary to disclose the amount of endemism in seed plants in the "California Floral Province."

The following 20 genera are those that have been noted as having the largest numbers of endemic species:

	Species Varieties			Species Varieties	
Mimulus	43	12	Carex	21	1
Astragalus	41	24	Delphinium	19	9
Lupinus	35	45	Cryptantha	19	8
Phacelia	31	16	Hemizonia	19	7
Eriogonum	30	34	Allium	18	13
Arctostaphylos	28	27	Castilleja	18	11
Ceanothus	28	17	Plagiobothrys	18	7
Chorizanthe	26	15	Navarretia	17	4
Clarkia	25	9	Penstemon	16	18
Calochortus	23	7	Malacothamnus	16	7

ENDEMIC VARIETIES

There are 985 endemic varieties among the 1557 definitely accepted varieties in A California Flora. This amounts to a high percentage of endemics, 63.07%. The percentage of endemism indicated by varieties in Jepson's Manual (as deduced in Leaflet West. Bot. 6:60,—1956) is 78.67%, a considerably higher figure. But again, just as in the case of endemism in species, the percentage of endemic varieties will undoubtedly be increased if the problem is approached on a provincial rather than a political basis.

INDEFINITE FORMS

The term "Indefinite Form" is applied here just as it was by Smith and Noldeke in their tabulation (1), *i.e.* to those named entities that are discussed at the end of diagnoses of definitely accepted species and varieties. Since these forms (that have been variously named as species, subspecies, varieties, or forms) are usually delimited geographically, it has been possible to estimate endemism among them. In this assemblage, 205 named plants out of a total of 426, or 47.93%, are endemic.

TOTAL ENDEMISM

Out of the total 6858 native California plants named by Munz and Keck, we count as endemic 2604, or 37.97%.

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WHENCE *MADROÑO* AND *ALISO*?

BY DWIGHT RIPLEY

Greenport, New York

Two California journals of botany are known by titles that are the Spanish common names of trees: *Madroño*, the journal of the California Botanical Society, and *Aliso*, the journal of the Rancho Santa Ana Botanic Garden. These simple-appearing names have obscure origins and etymological students do not agree how they came about.

Michaelis assumed that *madroño* came from a putative Lat. *maturoneus*, from *maturus*, since "the fruit of the arbutus ripens slowly, but when it is ripe it appears to be the very symbol of maturity, thanks to its beautiful red-purple coloring."

"Nonsense," says Corominas (whose superb *Diccionario Etimológico de la Lengua Castellana*, published in Madrid in 1954, I am quoting). "The above may be true, but it scarcely seems sufficient reason to distinguish its fruit from other wild and domestic fruits that also ripen prettily." Schuchardt favored *arbutus* and a supposed derivative *arbitroneus*—influenced perhaps by *madera*, wood, or *madre*, mother—but Corominas disagrees again and comes out strong for a pre-Roman '*morotonus*', adj. *morotoneus* (by metathesis, *motoroneus*). From *morotonus* come the Gallego *morodo* (which can mean *arbutus*, strawberry, or blueberry) and any number of local variants, including the euphonious *meruéndano* murmured by the shepherds of León. (The Portuguese word for strawberry is *morango*, as compared with Romance derivatives of the Lat. *fragum*, such as Fr. *fraise*, Sp. *fresa*, It. *fragola*, etc.; and Corominas takes a dim view of any connection with the Lat. *morum*, mulberry, although Michaelis and Schuchardt seem to think otherwise.)

In short, *madroño* really must come from a hypothetical "*morotonus*" by way of the adjective *morotoneus* > *motoroneus* > *madroño*. This line is supported by the many examples of the word, variously distorted, to be found in the Spanish dialects.

Probably, too, of pre-Roman origin is the word *aliso* which, though applied in California to the native sycamore, *Platanus racemosa*, means 'alder' in Spain and Spanish-speaking countries. It is hard indeed to find any point of resemblance between these two trees; whereas confusions between alder and poplar, or alder and elm (larch and cedar, juniper and pine, etc.), occasional in the Mediterranean region, are understandable. Kluge and Gamillscheg believe that *aliso* comes from a Gothic word corresponding to Eng. *alder*, Germ. *Erle*, and so on, despite the shift of accent ("áliza" to alíso) and the fact that this would be the only example of a Spanish tree-name having a Germanic origin. Hubschmid sees a connection with Lat. *alnus*, derived from some Indo-European, pre-Celtic tongue. And Bertoldi goes a step further and postulates a *pre*-Indo-European source for this as well as for the ancient Corsican word *alsu*. (Matters are scarcely helped by the fact that Fr. *alisier* refers to the white-beam, or *Pyrus Aria*, again a very different tree.) Corominas surveys the above tangle with his customary aplomb and suggests simply a pre-Roman origin for both *aliso* and for Basque *altz* (and, from another root, for Port. *amieiro*, alder), and on the whole we are inclined to agree with him.

DISTRIBUTIONAL NOTES ON
CHEILANTHES COOPERAE

IN THE SANTA CRUZ MOUNTAINS. *Cheilanthes Cooperae* D. C. Eaton is one of the ferns endemic to California. It has hitherto been known from Shasta County, Eldorado, Calaveras, Tuolumne, and Mariposa counties in the Sierra Nevada foothills, and from the Santa Ynez Mountains, Piru, and the vicinity of Colton in southern California. Recently, G. B. Youngberg, a student at San Jose State College, discovered *C. Cooperae* in limestone crevices about 2 miles west of Felton, Santa Cruz County (Youngberg 6003-0501, CAS, DS). *Cheilanthes Cooperae* is confined to limestone outcroppings and careful examination of other limestone areas in California will probably reveal additional localities for this fern.—JOHN H. THOMAS, Dudley Herbarium, Stanford University.

* * *

IN THE SANTA LUCIA MOUNTAINS. Do you realize that your distributional data as given for *Cheilanthes Cooperae*¹ does not include the Santa Lucias? On May 12, 1957, I found it on the north walls of an abandoned lime kiln as well as in crevices in large boulders and along the edge of Franklin Creek, Camp Natoma, San Luis Obispo County (No. 1902). I suppose I will eventually find it at Town Creek Spring and elsewhere on Lime Mt. and on Crystal Knob near Bryson just over the border in Monterey County. I have wondered if this was the fern that once grew by a shaded spring in limestone on Tierra Redonda. Some botanist pounced on it with joy and no one has ever seen it since. The people who live there have always wondered what fern it was, and so do I. I think this all happened quite a few years ago.—CLARE B. HARDHAM, Paso Robles, California.

* * *

IN THE SOUTHERN SIERRA NEVADA. When I wrote my notes on the distribution of pteridophytes endemic in the California Floral Province (Amer. Fern Journ. 50: 15-25,—1960), the only stations for *Cheilanthes Cooperae* in the Sierra Nevada that were known to me were from Mariposa County northward. It may now be reported from the southern Sierra Nevada from both Fresno and Tulare counties: shaded crevices in limestone at Boyden Cave, Kings River Canyon, 3100 ft. elevation, Fresno

¹ J. T. Howell in Amer. Fern Journ. 50: 20 (1960).

County, *Howell* 35380, June 6, 1960; Middle Fork Trail between Potwisha and Ash Mt., Sequoia National Park, Tulare County, *Richard C. Burns*, December 7, 1957. Hites Cove, Mariposa County, is the one definite Sierran station named by Robert J. Rodin in his treatment of the "Ferns of the Sierra" (*Yosemite Nature Notes* 39: 44-124, -1960).—J. T. HOWELL.

LUPINUS NOTES II: ECOLOGICAL MODIFICATION AND PHYLOGENETIC POSITION OF LUPINUS NIVEUS

BY DAVID B. DUNN

University of Missouri, Columbia

Seed material from two colonies of *Lupinus niveus* Wats. was collected in 1958 on Guadalupe Island off the coast of Baja California and kindly sent to me by Dr. Reid Moran. This is the only known location for this species. Both collections were grown in the greenhouses at the University of Missouri and seeds from both gave 100% germination upon scarification. In order to bring it into flower in time for studies on interfertility, one was grown within the range of supplemental light for extended day-length treatments that were being used on *L. concinnus* Agardh var. *Orcuttii* (Wats.) C. P. Sm. That one colony of *L. niveus* (Dunn 13060, 13074, (UMO)) responded and flowered so that interfertility with its close relatives *L. nanus* Dougl. subsp. *latifolius* (Benth.) Dunn and *L. nanus* subsp. *Menkerae* (C. P. Sm.) Dunn was tested.

All attempts at crossing *L. niveus* with both subspecies of *L. nanus* failed regardless of which species was used as the female parent. Of 25 flowers tested using *L. niveus* as the female, 5 pods developed partially before abscissing, a total of 120 ovules tested. *Lupinus nanus* subsp. *latifolius* was considered as next to the oldest or most primitive of the Pacific Coast *Micranthi*, after *L. affinis* Agardh, which was not available for testing (Dunn 1955, 1956). *Lupinus nanus* subsp. *Menkerae* responded to cross pollination in the same manner, testing 20 flowers, 5 pods starting, but abscissing.

The initiation of some pods suggests that the affinity of the two species is sufficiently close so that pollen germination occurred and that the embryos may have started to develop but that they failed early in their development with subsequent abscission of the pods. This suggests that the disposition of *L. niveus* as a member of the group *Micranthi* is correct.

There was a rather remarkable difference in the vegetative appearance of *L. niveus* grown in the greenhouse as compared with herbarium specimens from Guadalupe Island. A marked increase in leaflet size, a reduction in the amount of pubescence, and an erect slender habit were the most notable ecological modifications. With the onset of higher temperatures in the greenhouse (by mid-April) the typical dense felt-like mat of hairs and the smaller leaves and shorter internodes developed on the newer growth. By the time the longer day-length of summer arrived, the temperature was apparently too hot to permit flowering and not a single flower appeared on the plants of the second colony of *L. niveus*, which had been beyond the range of the artificial light used to increase the day-length while spring temperatures prevailed. *Lupinus niveus* required mechanical aid for pollination, having the same breeding mechanism described for *L. nanus* (Dunn, 1956). The plants also continued to grow through most of the summer, functioning as biennials, again suggesting a more primitive position in the group *Micranthi*.

The high endemism of *L. niveus* with restricted colonies only on Guadalupe Island suggests a very small breeding population with fixation of characteristics more or less at random as described by Dobzhansky (1941, 1951). Even so, the existence of the species is contingent upon its adaptation to the environment of the island habitat. Genetic isolation did develop during its geographic isolation; and while the above observations suggest narrow ranges of tolerance for flowering conditions, a rather broad range of tolerance for vegetative survival was observed.

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CLARKIA DAVYI ON SANTA ROSA ISLAND. Following the recent note by Lewis and Raven (Leaflet West. Bot. 9:94–95,—1960) on the distribution of *Clarkia Davyi* (Jeps.) Lewis & Lewis and *C. prostrata* Lewis & Lewis, I was able to obtain several collections of bud material from plants of this group on Santa Rosa Island, Santa Barbara County, California, as follows: Water Canyon, *Raven 14955*; Torrey pine grove, *Raven 15003*; Vail ranch house, *Raven 15011*. At first meiotic metaphase, plants of all these collections formed 17 pairs of chromosomes, and hence are *C. Davyi*. Furthermore, from a study of living material, it is also clear morphologically that they are *C. Davyi* (Lewis & Lewis, Univ. Calif. Publ. Bot. 20:241–392,—1955), since they have unspotted petals. Voucher specimens for these chromosome counts are deposited at the University of California, Los Angeles. The relictual occurrence of *Clarkia Davyi* on Santa Rosa Island strongly supports the hypothesis of Raven and Lewis (Brittonia 11:193–205,—1959), that it may have had a wider distribution in Pleistocene time, from which it has subsequently contracted, and that *C. prostrata*, its derivative, has come to occupy a portion of its former range following climatic change. A distribution of the sort presented by *Clarkia Davyi* is in agreement with other northern affinities exhibited by the plants of Santa Rosa Island and its neighboring island, San Miguel.—PETER H. RAVEN, University of California, Los Angeles.

CHONDRILLA JUNCEA IN IDAHO. On September 1, 1960, Mr. Clarence I. Seely collected a plant near Rathdrum in Kootenai County, Idaho, which was known locally as skeleton weed. This was tentatively identified as the biennial *Chondrilla juncea* L. Since no specimens were available for comparison, material was sent to Dr. Arthur Cronquist who verified our identification. The Idaho collections were made in a dry, gravelly, glaciated area, common on Garrison gravelly loam soil, 5 miles northwest of Coeur d'Alene, Rathdrum Prairie, Kootenai County, Idaho. This is the first record for the state of Idaho. It is known to occur in fields, in waste places, and along roadsides, from Michigan to New York, south to Virginia and West Virginia, an introduction from Europe. A specimen is deposited in the University of Idaho Herbarium with a duplicate in the New York Botanical Garden Herbarium.—WILLIAM H. BAKER, University of Idaho, Moscow.

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OBSERVATIONS ON THE LIFE CYCLE IN
ARCEUTHOBIUM CAMPYLOPODUM

BY JOB KUIJT

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As accurate data on the duration of the life cycle in *Arceuthobium* are wanting, it seems worthwhile to record some observations on the life cycle of the most common western species, *A. campylopodum* Engelm.

I recently reported the susceptibility of Torrey pine to *A. campylopodum* (Madroño 15:136,—1960). These successful inoculations have also yielded some information about the length of the life cycle of the dwarf mistletoe. Seeds collected from plants parasitizing *Pinus Sabiniana* Dougl. and *P. Coulteri* D. Don on Mount Diablo, California, were sown on potted *P. Torreyana* Parry during November, 1957. Germination in dwarf mistletoes is often an inscrutable affair, especially when the radicular pole of the seed contacts the axil of the host. Some seeds began germination during January, others somewhat later. No penetration seemed to have occurred by August, 1958, when the inoculated pines were moved from the campus of the University of California to the botanical gardens at Berkeley.

When I re-examined the pines in January, 1960, many individual infections of mistletoe were obvious. Some infections had only the smallest buds protruding from the host bark. Others, in contrast, had shoots which had apparently passed through their first flowering season the previous year, probably in late summer, 1959. As maturation of fruits in *A. campylopodum* requires one year, we can expect the earliest possible fruits to be ripe in the fall of 1960. In other words, the shortest possible complete life cycle appears to be three years, considerably shorter than usually believed. Obviously some infections would require four years to produce mature fruits.

These figures tally with observations made in 1956 on *A. campylopodum* growing naturally in California on *Pinus Sabiniana* near Columbia, Tuolumne Co., and on *P. muricata* D. Don near Inverness, Marin Co. In very young plants which flower for the first time, and which have become established on very recent host growth, the length of a life cycle can be read off directly. In the fall of 1956 I noted on the above two hosts

both staminate and pistillate plants in their first reproductive season, on 1954 growth. This means infection could not have taken place before 1954. The first berries would have matured in the fall of 1957. Again the life cycle is completed in three years.

From other inoculations in the field it seems clear that the length of the life cycle of *A. campylopodum* may vary depending on the host species involved. Some years ago I drew attention to the occurrence of this dwarf mistletoe on *Pinus contorta* Dougl. and *P. monticola* Dougl. (Madroño 13:170–172,—1956). The question posed at that time was whether the mistletoes freely “jumped” from *Tsuga heterophylla* (Raf.) Sarg. to the two pines. In the fall of 1955 I therefore attempted some cross-inoculations at Horne Lake, Vancouver Island. Seeds from plants growing on *P. contorta* were sown on young branches of *T. heterophylla* and *P. monticola*. All trees used already supported older plants of the same mistletoe species. None of the three hemlocks, and only two of the three white pines used showed new mistletoe infections when I revisited the area in June, 1958. The first white pine bore four infections, the other at least 15 infections at the places of inoculation. While the negative results are not definitive, the two infected white pines demonstrate that the plants from *P. contorta* may become established on *P. monticola*. Whether these plants would also grow on hemlock remains to be shown.

What is relevant here about these inoculations is the fact that the life cycle of these dwarf mistletoes appears to be longer than that of the California ones of the same species. The Horne Lake plants were sown in the fall of 1955. Three years later none of the new plants had developed flower buds. Flowering, therefore, could not take place until the fall of 1959; fruits would then mature during the last part of 1960. This means that no less than five years were necessary to complete the life cycle on *P. monticola*!

These observations then seem to establish the fact that the minimum life cycle of *A. campylopodum* is three years, but that in some cases it may be at least five years. The dwarf mistletoe perhaps varies genetically in this respect. It is also possible, however, that the parasite develops more slowly on *P. monticola* than on the other pines mentioned. If the latter is true, the slower development may be regarded as an important aspect of the host's relative immunity.

NOTES ON THE FLORA OF IDAHO—II*

BY WILLIAM H. BAKER

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The work on "A Taxonomic and Distributional Survey of Aquatic, Range and Weed Plants of Idaho" is nearing completion. Many plants have been added to the herbarium that can be placed in the categories as listed in "Notes on the Flora of Idaho—I" (2). Several of the records described in this article have been obtained by other collectors and credit to them is indicated in the text. These are added to the notes as plants new to Idaho when vouchers are present in the University of Idaho Herbarium. Thanks are expressed to the following for assistance in the identification of critical specimens obtained during the survey: Rupert C. Barneby, Lyle L. Phillips, Arthur R. Kruckeberg, David D. Keck, Rimo Bacigalupi, John Thomas Howell, and the late Ivan M. Johnston.

CAREX HETERONEURA W. Boott. Marshy ground along Pole Creek just below the Pole Creek summit, Boulder Mountains, Custer County, *Baker 10881*. New to Idaho. Reported previously from mountain meadows, Sierra Nevada, California and Nevada.

COMANDRA LIVIDA Richards. Woods at Luby Bay, Priest Lake, Bonner County, T60N R5W S24, *Baker 13624*; woods along Lamb Creek road, 5 miles east of Luby Bay, *Baker 13702*. Listed in Davis. This is the only Idaho locality known at present for this plant which grows in wet coniferous woods and sphagnum bogs and ranges from Labrador and Newfoundland to Alaska and British Columbia, south to northern New England, northern New York and northern Michigan.

ATRIplex PUSILLA (Torr.) S. Wats. Owyhee County: common, alkaline lake bed, 8 miles east of Oreana, desert shrub area, *Baker 8175*; dry, gravelly flat, desert shrub area, 4 miles north of Murphy, *Baker 8292*. Type, in edge of dried alkali flat near head of Humboldt Valley, Nevada. Alkaline soils, Upper Sonoran Zone, southeastern Oregon, northeastern California, and western Nevada. New to Idaho.

CHORISPERMUM VILLOSUM Rydb. Sandy shores, along desert water holes, Bruneau Sand Dunes, 6 miles northeast of Bruneau, Owyhee County, *Baker 11157*. First collection from Idaho. Common in sandy soils, Alberta to Colorado and Nevada.

* Funds for this work were provided by the Research Council of the University of Idaho under Special Research Project No. 31.

CALYPTRIDIMUM ROSEUM S. Wats. Cinders, east slope of Sunset Cone, Craters of the Moon National Monument, Butte County, a prostrate cinder plant, *Baker 13161*; cinders among lava, below Echo Cone, Craters of the Moon National Monument, *Baker 14303*. New to Idaho. Davis (3) says: "I have never seen a plant of this collected in Idaho, but it occurs so close that it probably occurs in the state." He gives the distribution as "Mountains, Wyoming to Oregon, south to Nevada." It also grows in eastern California.

ESCHSCHOLZIA CALIFORNICA Cham. Sandy soil along banks of the Clearwater River at Myrtle Beach, Nez Perce County, *Baker 11395*. Common as an escape in local situations throughout the state. Widely distributed from the Colorado River to Baja California and north to Washington.

PAPAVER RHOEAS L. Abundant on waste ground along railroad tracks, Pullman Road, Latah County, *Baker 13988*. Native of the Old World. Probably an escape from cultivation, it is well established in this locality.

STREPTANTHUS CORDATUS Nutt. On shale slopes in the Malad Range about 7 miles southeast of Malad, Oneida County, *Christ 19798*. This is an interesting new record not previously reported from Idaho. Known distribution as follows: Lake County, Oregon, to California, eastward to Arizona and Wyoming.

TELESONIX JAMESII (Torr.) Raf. var. *HEUCHERIFORME* (Rydb.) Bacigalupi. On Targhee Mountain, Fremont County, T16N R43E S11, *Christ 19079*. New record for Idaho. Davis (3) says, "to be expected in Idaho." Distributed from Alberta to South Dakota, western Wyoming to southeastern Nevada.

ASTRAGALUS ATROPUBESCENS Coult. & Fish. Sagebrush slopes above Mill Creek, 8 miles west of Challis, Custer County, T14W R18E, *Baker 10797*; hillsides, in the canyon of the Little Salmon River, 2 miles south of Pollock, Idaho County, *Christ 7268*; along the road to Leesburg, 24 miles west of Salmon, Lemhi County, *Christ 14707*; open shale slopes, 7 miles east of Tendoy, Lemhi County, *Christ 14777*. Known previously only from Montana.

ASTRAGALUS CANADENSIS L. var. *CANADENSIS*. Grassy hillside along the Pend Oreille River at Albeni Falls, Bonner County, *Baker 8987*. Usually found growing on moist soils of hillsides in thickets and on shores of streams and lakes, Hudson Bay to British Columbia, south to Georgia, Texas, and Colorado. This is the typical eastern variety and our collection is the first rec-

ord from the northwestern states. It is possibly introduced but more probably it has a continuous, though perhaps spotty, distribution from the eastern United States. Many eastern species of plants are known to be present in extreme northern Idaho.

CYTISUS SCOPARIUS (L.) Link. Escape from cultivation, Hayden Lake, Kootenai County, *Christ 1458*; store grounds, Hayden Lake, *Baker 14705*. The plant appears to be well established in several areas in northern Idaho.

LUPINUS HUMICOLA A. Nels. Open grassy ridge, 14 miles east of Leadore, Lemhi County, *Christ 14816*; mountain divide on Leesburg road, 20 miles west of Salmon, Lemhi County, *Christ 14759*. Records indicate that it is present in the extreme eastern portion of Idaho. It should also be looked for in northern Idaho, as the author has collected it along the river 23 miles east of Spokane, near the Washington-Idaho border.

TRIFOLIUM ANDERSONII A. Gray. Highway 95, heavy clay soils in Sucker Creek Valley, 27 miles southwest of Marsing on Idaho-Oregon line, Owyhee County, *Christ 17304*. Occurring previously, from southeastern Oregon to northeastern California and northwestern Nevada. This is the first record for Idaho.

AMSIACKIA INTERMEDIA F. & M. Edge of grassy meadow on the Manns Creek Grade, 7 miles south of Midvale, Washington County, *Baker 10227*. Identified by Ivan M. Johnston. Distributed from Washington to California. This is an authentic record of its presence in Idaho. It is not listed in Davis (3).

HACKELIA ARIDA (Piper) Jtn. Along the Yankee Fork of the Salmon River, 6 miles south of Bonanza, Custer County, *Baker 10784*. New record for Idaho. It has been collected before only in eastern Washington, the type locality, Ellensburg, Kittitas County. Identified by Ivan M. Johnston.

LAMIUM PURPUREUM L. Weed in waste places, Moscow, Latah County, *Baker 12829*; along roadside in Hope, Bonner County, *Dunkle 363*. O'Connell (4) records it from along roadside, just east of Hope, Bonner County.

MONARDA FISTULOSA L. var. *MENTHAEFOLIA* (Grah.) Fern. Bonner County: hillsides and rocky banks along the northeast edge of Lake Pend Oreille, 4 miles southeast of Hope, *Baker 13603*; dry hillside, Bonners Ferry, *Christ 827*; on shore line, Idlewild, Lake Pend Oreille, *Christ 11526*; grassy open flat, about 1 mile west of Blanchard, 2 miles northwest of Spirit Lake, *Baker 14992*. Probably grows in eastern Washington as the Blanchard collection is only a few miles from the state line.

These collections indicate a continuous distribution across northern Idaho. Quebec to Manitoba, British Columbia south to Georgia, Louisiana, Texas, and Arizona, east to Minnesota. Shorter, less branched plants with single head and with longest petioles usually shorter than 1 cm. have been called the variety.

ANTIRRHINUM ORONTIUM L. Sandy soil, one-fourth mile west of Deary, Latah County, *Torrell 119*. Fields and waste places; a casual weed often introduced in seed. Native of Europe and Asia.

VERONICA OFFICINALIS L. Wooded hillside along Schooner Creek, 14 miles east of Elk City, Darby Road, Idaho County, *Baker 21350*; open flat, 4 miles east of Highway 95, 2 miles north of Chilco, Kootenai County, *Baker 13588*; edge of field, Chichester Ranch, 5 miles west of Sandpoint, Bonner County, *Chichester 44*. Native of Europe. Now common in northern Idaho.

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NARDUS STRICTA IN IDAHO. One of the most remarkable additions to the plants of Idaho is *Nardus stricta* L., collected by Robert M. Richmond on July 12, 1960, near the mouth of Feather Creek, a tributary of the west fork of Potlach Creek, T41N, R1W, S12, about 9 miles northwest of Bovill, Latah County, Idaho. It is growing in an open meadow which probably has a fairly high water table, scattered over an area of about 50 square yards in extent, near the mouth of the creek. Associated species are *Poa pratensis* L., *Agrostis alba* L., and *Deschampsia caespitosa* (L.) Beauv. It occurs in the British Isles, Lapland, Norway, Sweden, and Germany; also reported from the Azores, northwestern Africa, and Asia; apparently native to Greenland and Newfoundland; introduced southward in Michigan, New York, and New Hampshire. The occurrence of this widely distributed grass in Idaho is hard to explain. —WILLIAM H. BAKER, University of Idaho, Moscow.

THE FARALLON FLORA

BY ROBERT ORNDUFF

Reed College, Portland, Oregon

In May, 1960, I visited South Farallon Island, a member of the island group which lies about thirty miles west of the California coast and the Golden Gate and is known to most people only as a silhouette on the horizon. This island, on which the famed light is located, is easily accessible to visitors, but apparently no list of its plants has been published since that of Blankinship in 1892 (*Zoe* 3: 144-165). At that time ten native and seventeen introduced vascular land plants were recorded.

Although I was able to spend only a short time on the island, the collection which was made is of some interest, especially when compared to the flora found there nearly seventy years ago. One native and two introduced species are newly recorded for the island. In addition, the identification of a few of the previously reported species is questioned. Unfortunately, Blankinship's collection has not been located and is feared to have been lost in the disastrous 1906 fire in San Francisco. Although several of the species from the earlier list were not found, this should not be interpreted as an inference of their absence from the island, since only a cursory survey was possible.

South Farallon Island is approximately 4000 feet long and 2500 feet wide at its widest point; the highest elevation is about 340 feet. It is almost exclusively composed of granite and the only soil available for plant growth is that derived from sea-bird guano. This soil is extremely rich in both phosphorus and nitrogen compounds; in most areas it is subjected to disturbance by the frequent movements of the thousands of birds which nest there. Rabbits, introduced during the nineteenth century, are abundant and their grazing of the plants is quite evident. The flora is a small one and is of interest not only for the species which are present, but for those which are absent. Many species characteristic of coastal central California are missing from the island. No doubt the unique edaphic conditions combined with the depredations of the rabbits severely restrict the composition of the flora.

The following list is based on my collections; unless otherwise noted the species can be assumed to have been included in the Blankinship list as well.

NATIVE SPECIES

AMSINCKIA SPECTABILIS F. & M. This species has not previously been reported from the island although it is frequently encountered on the mainland coast. It is fairly common on the island and is represented by depauperate plants with homostyled flowers.

BAERIA MINOR (DC.) Ferris subsp. *MARITIMA* (Gray) Ferris. The Farallons are the type locality for this subspecies, which is abundant on South Farallon Island and is used by the gulls and some cormorant species for nest construction.

JUNCUS BUFONIUS L.

MONTIA PERFOLIATA (Donn) Howell.

PLAGIOBOTHRYUS RETICULATUS (Piper) Johnst. var. *ROSSIANORUM* Johnst.

PSILOCARPHUS TENELLUS Nutt. var. *TENELLUS*.

SAGINA OCCIDENTALIS Wats.

SPERGULARIA MACROTHECA (Hornem.) Heynh.

SPERGULARIA sp. Plants of this species were as abundant as those of the former one, but badly eaten by the rabbits and not in flower. They may be referable to *S. media* (L.) Presl reported by Blankinship.

TILLAEA ERECTA H. & A.

Both *Erigeron glaucus* Ker and *Polystichum munitum* (Kaulf.) Presl were recorded by Blankinship. The erigeron would be expected on the island, but I suspect it is not common. The fern was reported only as a single individual which was collected and has probably not succeeded in becoming re-established on the island.

INTRODUCED SPECIES

ANAGALLIS ARVENSIS L. In the earlier report this was said to be limited to the small garden plot then present on the island, but now it is widespread and scarcely touched by the rabbits.

CHENOPODIUM sp. Blankinship reported *C. album* L. from the garden. The plants I collected were cropped by the rabbits and not identifiable, but may represent some other species since they were densely resinous-glandular about the inflorescence.

COTULA AUSTRALIS (Sieber) Hook. f. This weed, common on the mainland, has not been reported from the island where it is now abundant.

ERODIUM CICUTARIUM (L.) L'Her. The earlier report states that this species was well established on the island, but the specimens I saw were localized near the walks in the inhabited portion and severely chewed by the rabbits. It is difficult to believe that under these conditions the plants succeed in fruiting, and it is quite likely repeatedly introduced from the mainland.

FESTUCA DERTONENSIS (All.) Aschers. & Graebn. The only fescue which was reported earlier was the similar *F. myuros* L. As far as the island collections are concerned it is likely that only one species is represented and that it should be called *F. dertonensis*.

HORDEUM LEPORINUM Link. This grass is very common, particularly near the bird burrows, and seems to be able to tolerate the soil disturbances created by the birds.

POA ANNUA L.

POLYPOGON MONSPELIENSIS (L.) Desf. This grass presents a real puzzle. It is a very small, densely tufted plant of uncertain duration. It is closest in most respects to *P. monspeliensis*, but shows certain features of *P. interruptus* H.B.K., which is what Blankinship was referring to by the name *P. littoralis*.

SONCHUS ASPER L. Represented by extremely spiny, compact, thistle-like plants which are different in aspect from their mainland counterparts.

URTICA URENS L. This is a new record for the island.

Of the species Blankinship reported to be limited to the garden, I did not find six: *Avena fatua* L., *Malva parviflora* L., *Melilotus indicus* (L.) All., *Polygonum aviculare* L., *Trifolium bifidum* Gray var. *decipiens* Greene, and *T. microcephalum* Pursh. Although the clovers are native in California, their occurrence only in the cultivated garden suggested to Blankinship that they were introduced to the island, which view is probably correct. It is possible, however, that the garden served as a refugium for these species which had been exterminated elsewhere on the island by the rabbits. Two introduced species which were reported to be well established on the island, *Medicago hispida* Gaertn. and *Stellaria media* (L.) Vill., were not seen, nor was *Cerastium glomeratum* Thuill. collected.

It is evident that the flora of South Farallon is composed of equal numbers of native and introduced species; if the weeds

listed by Blankinship but not found by me are included, the introduced flora is composed of twice as many species as the native one. The native plants in the flora are, significantly, either weedy or members of genera with a large proportion of weedy species. Both the native and naturalized floras are being increased by additions such as *Amsinckia spectabilis*, *Cotula australis*, and *Urtica urens*. The flora of the island can be characterized as a depauperate one, consisting of a small number of mostly annual species, which are widespread on the island and are found also on the adjacent mainland.

SOME WEEDY PLANTS IN KERN COUNTY, CALIFORNIA, AND PARTS ADJACENT

BY ERNEST C. TWISSELMANN

Cholame, California

While reviewing my collections of weeds of the Kern County portion of the upper San Joaquin Valley, I found a number of range extensions and records that may be of value to other workers. The numbers in parentheses in the notes below are my collection numbers; all of these collections are deposited in the herbarium of the California Academy of Sciences and duplicates of most have been contributed to the herbarium of the University of California at Davis. I am indebted to Mr. Beecher Crampton for the determination of *Leptochloa viscida*, to Mr. Clifton Smith for *Heleochoa schoenoides*, and to Mr. John Thomas Howell for his critical review of all of the determinations.

Apparently the first California station for *Leptochloa viscida* (Scribn.) Beal, a sprangle-top of Arizona, New Mexico, and northern Mexico, is a small irrigation canal in the Buena Vista Lake region, on the Kern Lake Ranch Road 4.6 miles west of Highway U.S. 99 (4765). Although it grew in a fairly extensive colony along the ditch bank there, I have found no other stations for it as yet. However, its superficial resemblance to the very common *L. fascicularis* (Lam.) Gray and the less common

but widespread *L. uninervia* (Presl) Hitchc. & Chase has perhaps led to *L. viscida* being overlooked. At any rate, this station serves to record as a California weedy immigrant yet another plant of the moist places of the American Southwest.

Eriochloa gracilis (Fourn.) Hitchc., a weedy grass common in the Riverside, San Bernardino, and Imperial Valley regions, has been reported previously from Fresno County (Mason, A Flora of the Marshes of California, p. 155). In Kern County it grows at occasional stations in wet usually alkaline places on the plains south and west of Bakersfield (Stockdale Road at the Hiller Ranch, Greeley District, 4895; Cottonwood Road, 0.1 mile south of DiGiorgio Road, Greenfield District, 5449). To the north, in the Delano and McFarland districts, it is a common weed in light soil in several vineyards, sometimes growing abundantly (Driver Road 1.7 mile north of Peterson Road, McFarland District, 5568).

One of several species offered by seedsmen as "tall wheat-grass", *Agropyron elongatum* (Host) Beauv. is frequently planted in irrigated pastures. It has shown promising results for reseeding dry range lands in selected areas. Mr. Roy V. Parker, Kern County Farm Advisor, reports (personal communication) that in brush-burns in the digger pine-Douglas oak association in the Woody-Glennville region it has been seeded for several years and is apparently well established at several places.

It was seeded in 1955 in an area of about an acre on the Dorothy Twisselmann Ranch in eastern San Luis Obispo County (3018, 4546). This is in a region of Upper Sonoran grassland with an average rainfall of about 10 inches. Here it seems to be well established where it was first planted, and is slowly becoming more common about the ranch by natural re-seeding. At the University Test Plot, 2.5 miles west of Lost Hills, Kern County, efforts to grow it failed. However, a single robust plant (4875), apparently from accidentally scattered seed, grew through the protective cover of a salt bush (*Atriplex polycarpa*). This was in light soil, in an area with an annual rainfall of about 4 inches. It also occasionally occurs spontaneously in Kern County in waste places, usually in moist soil (Lerdo Highway, 3.2 miles east of Spicer City Gin (5462).

Agropyron trichophorum (Link) Richt., locally known as

pubescent wheatgrass, is reported by Mr. Parker also to be successfully established on seeded brush burns in the Glennville-Woody region. (He adds that it is grown under the name of Topar wheatgrass as a seed crop in Bright's Valley, west of Tehachapi.) I observed it in 1958 in one area where it had been seeded several years previously (Hill 3206, Henry Bowan Ranch near Glennville, 4473). Here it indeed seemed to be meeting competition, setting seed, and becoming a part of the established flora of the region. However, Mr. Parker states that although several years have passed since the original seedings, the grazing management has been more conservative than is typical for California range lands, and that it is perhaps still premature to say that *A. elongatum* and *A. trichophorum* are permanently established and self-sustaining elements of the grasslands of the Woody-Glennville region.

A third wheatgrass, *A. desertorum* (Fisch.) Schult., apparently has not been successful. Occasional plants, presumably from seedings, are found (Upper Quatal Canyon, San Emigdio Range, 2747), but nowhere in Kern County does it appear to be established, even on a limited basis. The seeding reported by me previously (Wasmann Journal of Biology 14:202) at the Dorothy Twisselmann Ranch in eastern San Luis Obispo County is not persisting. Indeed, after initially favorable growth, most of the plants have now disappeared. I would be inclined to think that the reason for the failure is primarily lack of late spring and summer rainfall and competition from winter annuals, rather than the scant total rainfall.

The weedy grass, *Heleochloa schoenoides* (L.) Host, grows at the Cholame Ranch, Cholame, San Luis Obispo County. It is known in California in the central valley from Merced County to Butte County, and also from Lake County, where it grows in vernal pools or at pool margins (acc. to Mason, A Flora of the Marshes of California, p. 165). At Cholame, far to the south, it grows in low-lying winter-wet alkaline soil in a heavily grazed pasture just north of the Cholame Ranch headquarters (4873).

Scirpus saximontanus Fern. has been previously reported in California from Ventura and Kern counties (Leafl. West. Bot. 8:159; Wasmann Journal of Botany 14:212), reports which were apparently overlooked by the authors of two recent California floras. The initial station for Kern County, a drying drainage

pool on the Corcoran Highway 8 miles north of Highway U.S. 466 (1642), remains the only known station for Kern County. *Scirpus tuberosus* Desf., also previously reported (Wasmann Journal of Biology 14:212), is fairly common in wet places about 8 miles north of Semitropic on the Lost Hills-Semitropic alkali plains. According to Mason (A Flora of the Marshes of California, p. 309), it occurs at stations in Glenn, Colusa, and Butte counties in the Sacramento Valley. In Kern County, it occurs where "duck clubs" have been established by pumping water on the relatively impervious alkali soil. It would seem, then, that both of these sedges are present in Kern County on what would naturally be extremely arid alkaline plains only because of commercial duck hunting.

Although various manuals state that *Morus alba* L., a native of China widely planted as a shade and ornamental tree, is frequently spontaneous in the United States, I can find no reference to its spontaneous occurrence in California in state or local floras. Hence the scattered occurrence of white mulberry in the dense growth of shrubs and trees along Kern River 2.2 miles west of Stockdale Country Club (4752, 5000) is apparently unusual for this state. The trees grow here for some distance along the river in an area rather far from gardens or other ornamental plantings and seem to be a fairly well-established part of the stream bank flora. This dense river bank growth, of such species as *Populus Fremontii*, *Salix Gooddingii* var. *vallicola*, *Baccharis viminea*, *Urtica holosericea*, and other typical valley stream bank plants, extends to the east of Bakersfield, about five miles away. As this part of the river is not open to the public, I am unable to say how far white mulberry remains a part of the association. However, I have not observed it as an escape in or about Bakersfield.

Previously known from California in the Imperial Valley and Colorado Desert as far north as Yermo and Desert Center, *Trianthema Portulacastrum* L. is now well established in Kern County and southern Tulare County. Although apparently a recent arrival, it grows abundantly at many places, usually as a cotton field weed in light moist often alkaline soils. The Tulare County collection is from a dense colony growing in a portion of a cotton field where the alkali content of the soil was so great that the cotton developed only as small much-stunted plants.

Even in such heavily alkaline soil, the growth of horse purslane was dense and well developed.

I believe that the plant not only appeared recently in the upper San Joaquin Valley, but that it has spread with great speed. In 1958, it was abundant in wet irrigation ditches in some of the cotton fields south of Semitropic in areas where it did not grow at all in 1956 and previous years when I collected extensively in the region. Further, unless it appeared only recently, it is difficult to believe that such a common plant would not previously have been reported. I have collected it at the following stations, all in Kern County except the last: Weedpatch District: Adobe Road, 4.5 miles south of Bear Mountain Boulevard, 4907. Bakersfield District: Kern Island Road just south of the Kern Valley Packing Company Plant, 5453. Buttonwillow District: Brandt Road at Buttonwillow Highway, 4786. Semitropic District: Goose Lake Road 0.5 mile south of Highway U.S. 466, 4882. Westside: Antelope Valley, 10 miles west of Blackwell's Corner, 784. Tulare County: alkali plains about 7 miles southwest of Earlimart, 5590.

The occurrence of *Lepidium oxycarpum* T. & G. in the Cholame Valley in extreme southern Monterey County (and undoubtedly also in the same valley in adjacent San Luis Obispo County) is a significant range extension for this San Francisco Bay region pepper-grass. It grows in abundance in heavily alkaline soil in the alkali sinks near the Cholame Ranch headquarters (5073). The previous southernmost known station is in San Benito County at what might be considered the outermost limits of the bay region influence. Cholame Valley is well isolated by the Inner South Coast Ranges from San Benito County, and the much more arid climate gives the new station even added ecological significance.

Eclipta alba (L.) Hassk., known from the northern parts of the San Joaquin Valley, now can be reported as a rare weed from Kern County. It was collected as a rice field weed in the Buttonwillow District, 0.25 miles west of the Tupman road on Taft Highway (4878), and in the Greeley District from a canal bank at Stockdale and Renfro roads (4892). At the first station there were several plants, at the second, only one. Thus, the plant is apparently now gaining a foothold in the county but is not yet a well-established part of the wet-place weedy flora.

NOTE ON GYMNOSPERMA GLUTINOSUM
(COMPOSITAE-ASTEREAE)

BY OTTO T. SOLBRIG

Gray Herbarium, Harvard University

Gymnosperma glutinosum Less. is a common suffrutescent shrub in open, semi-desert regions from northern Guatemala to the southern parts of the states of Arizona and New Mexico and the southwestern part of Texas (fig. 1). It grows in the dry sonoran life zone associated with xerophytic shrubs and *Cactaceae*, mainly on loose and alkaline soils (Rzedowski, 1956).

It is characterized by its short ligulate flowers which do not surpass the tubular ones and which give the heads an almost discoidal aspect. The pappus is reduced to an almost microscopic ring. The involucre is turbinate-elongate. Vegetatively it has rather broad leaves which are quite glutinous. The relationships are not altogether clear, although it appears to be related to the *Gutierrezia* alliance (Solbrig, 1960).

Plants of *Gymnosperma glutinosum* were grown at the Botanical Garden of the University of California at Berkeley. Acetocarmine squashes of pollen-mother cells showed seven pairs of chromosomes at meiosis. No irregularities could be discovered (Raven, Solbrig, Kyhos, & Snow, 1960).

This species was first described by Sprengel in 1819, as the only species of the genus *Selloa*, from material grown at the Botanical Garden at Berlin, supposedly from Brazil. A year later, Humboldt, Bonpland, and Kunth (1820) described a new genus of *Compositae-Heliantheae* from Mexico, and possibly not being aware of Sprengel's publication, gave it also the name *Selloa*. Since the strict rules of priority of our day were not in effect in the last century, Lessing (1832) accepted Kunth's *Selloa* over Sprengel's, renaming *Selloa glutinosa* Sprengel as *Gymnosperma glutinosum*. Lessing's decision was followed by DeCandolle who also described three new species of *Gymnosperma*: *G. corymbosum*, *G. multiflorum*, and *G. scoparium*. Probably because of DeCandolle's influence, the name *Gymnosperma* was adopted for the asteraceous genus, while *Selloa* was used for H.B.K.'s plant by most botanists. In 1926, S. F. Blake, realizing that *Selloa* Spreng. and *Gymnosperma* Less. pertained to the same plant, followed the principle of priority, rejected *Gymnosperma*, and restituted the name *Selloa glutinosa* Spreng. Also,

after examining all the types of DeCandolle, he came to the conclusion that only a single species was involved. M. L. Green (Rehder, Weatherby, Mansfeld, & Green, 1935) considered the almost consistent use of *Selloa* H.B.K. in standard works of the 19th century sufficient reason for conservation, and proposed it to the International Botanical Congress in Amsterdam, which adopted it (Sprague, 1940). This notwithstanding, American botanists followed S. F. Blake in rejecting *Gymnosperma*, using the name *Selloa* in standard floras (e.g., Kearney & Peebles, 1951).



Fig. 1. Distribution of *Gymnosperma glutinosum* Less. Each dot represents a locality, regardless of the number of collections.

The validity of conserving *Selloa* H.B.K. is objectionable since not more than three species are involved altogether and none is of economic importance. Furthermore it is now clear that the original intention of avoiding confusion has not been achieved. It is hoped that the present note will clarify the nomenclatural situation.

In the course of the present investigation the material of the Gray Herbarium (GH) and Arnold Arboretum (A) of Harvard University, the University of California Herbarium (UC), and the United States National Herbarium (US) has been examined.¹ After studying this material, I am of the opinion that S. F. Blake's decision of treating the genus as monotypic is the correct one.

GYMNOSPERMA GLUTINOSUM Less. Syn. Gen. Comp. 194 (1832).

Selloa glutinosa Spreng. Nov. Prov. Hal. 36 (1819). *Molina viscosa* Hort. Berol.; Spreng. Nov. Prov. Hal. 37 (1819), as synonym. Not *Molina viscosa* Ruiz & Pavon (1798).

Gymnosperma corymbosum DC. Prodr. 5: 312 (1836); *Selloa corymbosa* (DC.) Kuntze, Rev. Gen. Pl. 1: 362 (1891).

Gymnosperma multiflorum DC., loc. cit. *Selloa multiflora* (DC.) Kuntze, loc. cit.

Gymnosperma scoparium DC., loc. cit. *Selloa scoparia* (DC.) Kuntze, loc. cit.

SELECTED SPECIMENS:

GUATEMALA. Aguatán, Dept. of Huehuetenango, *Skutch s. n.* (US).

MÉXICO. 30 miles west of Saltillo, Coahuila, *Solbrig & Ornduff 4600* (UC); 10 miles west of Dolores Hidalgo, Guanajuato, *Solbrig & Ornduff 4546* (UC); 19 miles east of San Luis Potosí, San Luis Potosí, *Solbrig & Ornduff 4552* (UC).

UNITED STATES. Stephen's Ranch, Chiricahua Mts., Arizona, *Blumer 1497* (US); Organ Mts., New Mexico, *Wootton & Standley s. n.* (US); 6 miles west of Saucó, Texas, *Cory 5296* (GH); Limpia Canyon near Fort Davis, Texas, *E. J. Palmer 34464* (A).

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¹I am thankful to the directors and curators of these institutions for making the material in their custody available.

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ECOLOGICAL NOTE ON THE OCCURRENCE OF *BAERIA LEPTALEA*

BY CLARE B. HARDHAM

Paso Robles, California

Baeria leptalea (Gray) Gray, an endemic species of interior Monterey and San Luis Obispo counties, is restricted to mesic habitats on sterile sandy soils where there is little competition from other species. It is a common species on the sandstone formations of the Nacimiento and San Antonio river valleys but it is rare elsewhere in the foothills of the Santa Lucia Range. It has been found in only one area east of the Salinas River.

The usual ecological niche for *B. leptalea* is a bare sandy area at the foot of a steep wooded north slope. Other species typical of this habitat are: *Dodecatheon Clevelandii* Greene, *Collinsia sparsiflora* F. & M. var. *collina* (Jeps.) Newsom, *Plagiobothrys tenellus* (Nutt.) Gray, *Gilia clivorum* (Jeps.) V. Grant, and *G. ochroleuca* Jones ssp. *bizonata* A. & V. Grant (autogamous form). *Baeria leptalea* also grows on shaded sandstone and granite ledges overlooking stream beds.

In the vicinity of Tierra Redonda, a high ridge on the north shore of the Nacimiento River near Bee Rock, there is more rainfall than in the rest of the Nacimiento and San Antonio river valleys where the hills are all much lower. Here it is not

uncommon to find *B. leptalea* growing in depressions in open fields and on bare slopes with a northerly exposure.

On the sandstone ledges at The Indians, headwaters of the Arroyo Seco River, *B. leptalea* grows on low islands in an ephemeral stream with *Juncus bufonius* L., *J. Kelloggii* Engelm., *Trifolium Grayi* Loja, *Mimulus Douglasii* (Benth. in DC.) Gray, and *Chorizanthe polygonoides* T. & G.

In San Luis Obispo County many colonies of *B. leptalea* have been found in Atascadero growing in openings in forest of *Quercus agrifolia* Née on sandy north slopes. Here the common associated species are more xeric and include *Chorizanthe californica* (Benth.) Gray, *Arenaria californica* (Gray) Brewer, *Oenothera dentata* Cav. var. *campestris* (Greene) Jones, *Linanthus dichotomus* Benth., and *L. Parryae* (Gray) Greene.

East of the Salinas River there is less rainfall than in the foothills of the Santa Lucia Range and, though many appropriate places have been investigated in the sandstone formations north of San Miguel and in the decomposed granite hills near Creston, *B. leptalea* has been found only on the north slopes of Black Mountain east of Creston. Black Mountain is 3600 feet high and therefore receives more rainfall than the surrounding lowlands. The *Baeria* has been found on shaded granite ledges overlooking the bed of an ephemeral stream, at the foot of steep wooded north slopes and, by Ernest Twisselmann (No. 2608), beside an ephemeral stream with *Linanthus Parryae*.

It is usual to find an abundance of *B. chrysostoma* F. & M. growing very near to, or even surrounding, colonies of *B. leptalea* but one never finds more than one or two plants which have strayed into the territory of the other species. Since thousands of individuals of each species may be growing side by side the amount of mixing is statistically negligible. *Baeria chrysostoma* always grows where it is a little drier or sunnier and usually where the soil is suitable for an abundance of other species, especially grasses.

It is probable that the only reasons that *B. leptalea* has not been collected more frequently are that its preferred habitats are off the beaten track and look unpromising to the casual glance. Once its requirements are known—an almost pure sandy soil, a mesic climate, and no competition from other species—it is easy to find colonies of the *Baeria*.

A NEW MANZANITA FROM THE
SANTA LUCIA RANGE, CALIFORNIA

BY PHILIP V. WELLS

In April, 1960, Dr. Robert F. Hoover collected flowering specimens of a manzanita near the summit of Nacimiento Pass, Monterey Co., California, which appeared to be a variant close to *Arctostaphylos Andersonii* Gray. The writer visited the locality on May 1, and made additional collections and observations. This manzanita is a leafy-bracted, non-crown-sprouting species showing a relationship to *A. Andersonii* in the cordate leaves and general, glandular pubescence. However, the leaves are distinctly petioled, with stomata and glandular hairs about equally distributed on both surfaces of the blade. A careful comparison with *Arctostaphylos* collections at the California Academy of Sciences and the University of California, Berkeley, indicates that this manzanita presents a unique combination of characters, which in this critical genus warrants specific recognition.

Arctostaphylos Hooveri P. V. Wells, spec. nov. Frutex erectus, 2-4 m. altus, ramulis pubescentibus, glandulosus; foliis pallidis, glandulosus et stomatiferis supra et infra, oblongo-ovatis (maximis 5 cm. longis et 3 cm. latis), saepe serratis, cordatis, petiolatis, petiolis 2-10 mm. longis; inflorescentia paniculata, magna, rhachidibus glandulosus, bracteis foliaceis, glandulosus, pedicellis glandulosus; corolla 7-8 mm. longa, alba; ovario glanduloso.

Tall, erect, sub-arborescent shrub to over 4 m. high, averaging about 3 m., with a well-defined trunk and without basal burl; bark smooth, dark red-brown. Branchlets densely short-pubescent and hispid with longer, glandular hairs. Leaves ovate to oblong, 3-5 cm. long, acute to obtuse, cordate, entire or often serrulate, on petioles 2-10 mm. long; blades gray-green and glandular-hairy on both surfaces, with equal numbers of stomata above and below. Inflorescence large, open, paniculate, leafy-bracted, the bracts, rachises, and pedicels glandular-hairy; bracts to 15 mm. long, pedicels to 10 mm. long. Corolla white, 7-8 mm. long; ovary densely glandular-hairy; fruit oblate-spheroidal, glandular-viscid, on straight pedicels; nutlets separable.

The type, *Hoover & Wells 1960*, collected on May 1, 1960, is in the herbarium at California Polytechnic College, San Luis Obispo. Isotypes are at the California Academy of Sciences and University of California, Berkeley.

Arctostaphylos Hooveri is locally abundant on shallow soils underlain by gneiss bedrock along the roads leading north and

south from the summit of Nacimiento Pass, at elevations of about 3000 feet. The pass is situated a few miles south of Cone Peak, one of the highest points in the Santa Lucia Range. It seems to be a pioneer or successional shrub, occurring chiefly along roadsides and in other openings in the forests dominated by broad-sclerophylls (*Arbutus*, *Lithocarpus*, and *Quercus*) and locally by *Pinus ponderosa*. It was not found in the dense stands of nearby chaparral dominated by *Adenostoma fasciculatum* and the crown-sprouting *Arctostaphylos glandulosa* Eastw.

Hoover's manzanita seems to combine characters of *A. glandulosa* and *A. Andersonii*. The former is abundantly present, but an intensive search of the area failed to produce *A. Andersonii* or any other member of the genus.

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A NEW ERIOGONUM FROM THE SANTA LUCIA RANGE, CALIFORNIA

BY JOHN THOMAS HOWELL

Eriogonum Butterworthianum J. T. Howell, spec. nov. Herba fruticulosa, 1–1.5 dm. alta, laxa ramosa, caulibus gracilibus basi lignosis cortice ruda obtectis, ramulis novis tomentosis foliosis caulem scapiformem ferentibus supra; foliis sublinearibus vel anguste ellipticis perrevolutis, (0.5 vel) 1–2 cm. longis, 1–4 mm. latis, tomentosis infra et supra, acutiusculis apice, basi angustatis in petiolum breve; scapo 1–3 cm. longo, simplici vel 1- vel 2-ramoso; involucris solitariis sessilibus, 1 vel paucis, plerumque 1 involu- crum raro 2 vel 3 involucria racemose disposita scapo vel ramulo ferenti, involucris urceolato-turbinatis, 5–6 mm. longis, albo-tomentosis, dentatis, dentibus 1–2 mm. longis, acutis, pedicellis laevibus glabris, bracteolis glandu- loso-fimbriolatis; perianthiis 4–5 mm. longis, glabris ochroleucis rubro- costatis, segmentis exterioribus usque ad 2 mm. latis, interioribus minoribus, in basem brevem angulatam stipiformem connatis infra; filamentis glabris supra, ciliato-pubescentibus basi, antheris ochroleucis, late ellipticis, circa 0.5 mm. longis; achenio circa 3 mm. longo, acute cuneato basi, crasse rostrato, rostro prominenter triangulari reticulato-cellulari.

Type: Herb. Calif. Acad. Sci. No. 422293, collected by Clare Butterworth Hardham (No. 6387) on July 15, 1960, from crevices of sandstone in full sun at The Indians near the headwaters of the Arroyo Seco River, elevation 2200 feet, Santa Lucia Range, Monterey County, California.

This beautiful little saxicolous species may well be said to express the *E. Wrightii* complex reduced to lowest terms. Although in sizes of flowers and involucre it surpasses the usual dimensions of those parts in that variable and widespread group, nowhere does *E. Wrightii* exhibit so reduced an inflorescence. The leafy part of the plant is strikingly similar to the corresponding part of *E. Wrightii* var. *trachygonum* (Torr.) Jeps. as that variety grows in the drier parts of the California Coast Ranges. *Eriogonum Butterworthianum* is probably an endemic of the Santa Lucia Range where no relative of *E. Wrightii* has been known heretofore.

THE ENDEMIC GRASSES OF THE CALIFORNIA FLORAL PROVINCE

BY BEECHER CRAMPTON

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The formulation of boundaries for a California Floral Province by John Thomas Howell in 1957 (Leaflet West. Bot. 8:133-138) prompted the author to investigate the degree of endemism among the grass species in this province. The following list of species is the result of this study. The genera *Orcuttia* and *Neostapfia* are unique in themselves and almost wholly restricted to the Great Valley of California. Agricultural pursuits are gradually removing the habitat of the species in these two genera and it is foreseeable that they may become extinct. The majority of the endemics are of the great temperate grass tribes, *Festuceae* and *Agrostideae*, occupying various habitats from coastal to interior foothills, mountains, and mountain peaks. A total of 61 species is listed for the province. This compares with a total of 49 species endemic to California in a political sense, as enumerated by Howell and Noldeke (Leaflet West. Bot. 9:122, -1960).

In the distributional notes, the place names are Californian unless otherwise indicated.

AGROPYRON PARISHII Scribn. & Smith. Woodlands and coniferous forests mostly below 7000 ft.; probably restricted to California. The var. *laeve* Scribn. & Smith is the most common.

AGROPYRON PRINGLEI (Scribn. & Smith) Hitchc. Rocky slopes, 7000–11,000 feet; Sierra Nevada from Nevada County south to Tuolumne and Mono counties.

AGROSTIS AMPLA Hitchc. Mostly in northern California at lower elevations; extent of range in Oregon not known.

AGROSTIS ARISTIGLUMIS Swallen. Point Reyes Peninsula, Marin County, the only known locality.

AGROSTIS BLASDALEI Hitchc. Bluffs and dunes along the coast; Del Norte County south to Marin County.

AGROSTIS CALIFORNICA Trin. Bluffs along the coast; Humboldt County south to Santa Cruz County.

AGROSTIS EXIGUA Thurb. Napa and Sonoma counties; Great Valley from Shasta County south to Stanislaus County, often bordering vernal pools; perhaps in the foothills of the Sierra Nevada.

AGROSTIS HALLII Vasey. Coast Ranges, from Santa Barbara County north to coastal Oregon.

AGROSTIS HOOVERI Swallen. Woodlands; San Luis Obispo and Santa Barbara counties.

AGROSTIS LEPIDA Hitchc. Middle elevations in the central and southern Sierra Nevada; San Bernardino Mts.

AGROSTIS LONGILIGULA Hitchc. Bogs along the coast; Marin County north to Oregon (Tillamook County).

BROMUS GRANDIS (Shear) Hitchc. Open or wooded slopes; middle elevations in the southern Sierra Nevada and South Coast Ranges, south to San Diego County.

BROMUS MARITIMUS (Piper) Hitchc. Bluffs along the coast; Lane County, Oregon, south to Monterey County.

BROMUS PSEUDOLAEVIPES Wagnon. Coast Ranges, probably from Lake County south to San Diego County; eastward to Fresno, Kern, San Bernardino, and Riverside counties.

CALAMAGROSTIS BOLANDERI Thurb. Bogs along the coast; Humboldt, Mendocino, and Sonoma counties.

CALAMAGROSTIS BREWERI Thurb. Meadows; northern California in the Salmon and Trinity Alps at about 6000 feet; Nevada County south in the Sierra Nevada to Tulare County, 9000–12,000 feet.

CALAMAGROSTIS CALIFORNICA Kearney. Northern Sierra Nevada.

CALAMAGROSTIS DENSE Vasey. Mountain ranges of central San Diego County.

CALAMAGROSTIS FOLIOSA Kearney. Coastal Humboldt and Mendocino counties.

CALAMAGROSTIS OPHITIDIS (J. T. Howell) Nygren. On serpentine in Marin, Sonoma, and Lake counties.

DESCHAMPSIA HOLCIFORMIS Presl. Coastal bluffs, bogs, and open pastures; Oregon south to Monterey County.

DISSANTHELIUM CALIFORNICUM (Nutt.) Benth. Islands off the coast of southern California and Baja California.

ELYMUS CONDENSATUS Presl. Along the coast on wooded or open slopes; San Francisco south to San Diego County; inland to western Kern County and western San Bernardino County.

ELYMUS PACIFICUS Gould. Coastal dunes; Mendocino County south to Monterey County.

FESTUCA CALIFORNICA Vasey. Woodland or chaparral associations, mostly coastal; west of the Cascade Range in Oregon south to Monterey County; also San Bernardino Mts.

FESTUCA ELMERI Scribn. & Merr. West of the Cascades in Oregon, south mostly in the Coast Ranges to Monterey County; also in the northern Sierra Nevada from Butte County south to Placer County.

HIEROCHLOE OCCIDENTALIS Buckl. Redwood forest; coastal from Oregon south to Monterey County. (Adventive in Washington?)

HORDEUM CALIFORNICUM Covas & Stebbins. Interior Coast Range of northern California, south through the Coast Ranges to San Diego County. Doubtfully in Oregon.

HYSTRIX CALIFORNICA Scribn. Forests and shaded canyons near the coast; Sonoma and Marin counties south to Santa Cruz County.

MELICA CALIFORNICA Scribn. Chaparral and oak woodland; Kern County, north in the Coast Ranges and on the lower west slope of the Sierra Nevada, to Siskiyou County. (Possibly in southeastern Oregon and northern Nevada, but not surely known; may be confused with *Melica bulbosa*.)

MELICA IMPERFECTA Trin. Chaparral and oak woodland; Lake County, California, south to San Diego County. Central and southern Sierra Nevada, Mariposa County to Kern County; San Bernardino Mts.

MELICA TORREYANA Scribn. Chaparral and oak woodland; mostly in the Coast Ranges from San Luis Obispo County north to Humboldt County; rarer in the Sierra Nevada from Butte County south to Mariposa County.

MUHLENBERGIA CALIFORNICA Vasey. Mountains of Los Angeles and Riverside counties, 1500–7000 feet.

NEOSTAPFIA COLUSANA (Davy) Davy. Vernal pool association; Great Valley in Colusa, Solano, Stanislaus, and Merced counties.

ORCUTTIA CALIFORNICA Vasey. Dry bottoms of vernal pools; Great Valley from Sacramento County south to Tulare County; San Bernardino and Los Angeles counties south to Baja California (San Quintín Bay).

ORCUTTIA GREENEI Vasey. Great Valley from Tehama County south to Tulare County.

ORCUTTIA MUCRONATA Crampton. Known only from a single dry lake bed, Solano County.

ORCUTTIA PILOSA Hoover. Vernal pool beds; San Joaquin Valley from San Joaquin County south to Madera County.

ORCUTTIA TENUIS Hitchc. Vernal pools; Shasta and Tehama counties; Lake County, California (Boggs Lake).

ORYZOPSIS KINGII (Boland.) Beal. Sierra Nevada, 8000–11,000 feet, Tuolumne County south to Tulare County among the high peaks.

PANICUM SHASTENSE Scribn. & Merr. Castle Crags, Shasta County, the only known location.

PHALARIS CALIFORNICA Hook. & Arn. Coastal woodlands; San Luis Obispo County north to southwestern Oregon.

PHALARIS LEMMONI Vasey. Coast Ranges from Mendocino County south to San Diego County; common in vernal pools in the Great Valley, Tehama County south to Kern County.

PLEUROPOGON CALIFORNICUS (Nees) Benth. Vernal pools or meadows at low elevations; Coast Ranges from Humboldt County south to Santa Clara County, extending into the lower Sacramento Valley in Solano and Sacramento counties.

PLEUROPOGON DAVYI Benson. Moist meadows; North Coast Ranges in Humboldt, Mendocino, and Lake counties.

PLEUROPOGON HOOVERIANUS (Benson) J. T. Howell. Moist meadows; Marin County, possibly north into Mendocino County.

POA ATROPURPUREA Scribn. Known only from the San Bernardino Mts.

POA DOUGLASHI Nees. Coastal dunes and bluffs; Mendocino County south to Monterey County.

POA FIBRATA Swallen. Known only from Shasta Valley, Siskiyou County.

POA KELLOGGII Vasey. Redwood forest; Corvallis, Oregon, south to Santa Cruz County.

POA NAPENSIS Beetle. Known only from near Calistoga, Napa County.

POA RHIZOMATA Hitchc. Southwestern Oregon and northwestern California.

POA TENERRIMA Scribn. At lower elevations; Sierra Nevada, Eldorado County; also the South Coast Ranges.

PUCCINELLIA SIMPLEX Scribn. Alkaline plains of the Great Valley; around hot springs, Calistoga, Napa County.

STIPA CERNUA Stebbins & Love. Oak woodland and chaparral of the foothills; Tehama County south in the Inner Coast Range reaching the coast at San Francisco and Monterey and extending south to San Diego County; Sierra Nevada foothills from Tehama County south to Kern County.

STIPA CORONATA Thurb. North Coast Range (Napa County) to Monterey County and south to Baja California; interior South Coast Range east to the Tehachapi Mts. and south through the San Gabriel and San Bernardino mts.

STIPA DIEGOENSIS Swallen. Coastal San Diego County and northern Baja California.

STIPA LATIGLUMIS Swallen. Yosemite Valley, central Sierra Nevada.

STIPA LEPIDA Hitchc. Low elevations; Humboldt County south in the Coast Ranges to San Diego County and northern Baja California; Tehama and Shasta counties south in the Sierra foothills to Mariposa County.

STIPA PULCHRA Hitchc. Low elevations in oak woodland and chaparral; Coast Ranges from Humboldt County south to San Diego County and Baja California; islands off the southern California coast; foothills surrounding the Great Valley; Sierra Nevada from Shasta County to Mariposa County.

STIPA STILLMANII Boland. Chiefly in the northern Sierra Nevada from Tehama and Plumas counties south to Placer County.

ON MUHLENBERGIA MEXICANA FORMA
AMBIGUA IN CALIFORNIA

BY PETER RUBTZOFF

Specimens of a variant of *Muhlenbergia mexicana* (L.) Trin. with conspicuously awned lemmas are present in the Herbarium of the California Academy of Sciences from several stations in California.

Two forms of this species having lemmas with awns 4 to 10 mm. long are listed by A. Chase (Hitchcock, 1950, pp. 397, 903), forma *ambigua* (Torr.) Fernald and forma *setiglumis* (S. Wats.) Fernald, the difference between the two being in the presence on the tips of the glumes of the latter form of an awn 1 to 2 mm. long.¹ However Mrs. Chase adds: "the two [forms] scarcely distinct."

A considerable variation, even within the same panicle, was found to exist in the length of the awns on the glumes in the California material, in which all intergrades between points 0.25 mm. long and awns 2.5 mm. long were found. Since the original descriptions of *M. ambigua* (Torrey, 1843, p. 164) and *M. sylvatica* T. & G. var. (?) *setiglumis* (Watson, 1871, p. 378) did not furnish any additional clues, resort to type material appeared to be necessary to determine the identity of our plants. The type of *M. sylvatica* var. (?) *setiglumis* was borrowed from the Gray Herbarium, and an isotype of *M. ambigua* from the New York Botanical Garden.

The isotype of *M. ambigua* appeared to have awns on the tips of the glumes ranging from somewhat less than 0.5 mm. to slightly over 1 mm. in length, most of them being 0.75 mm. long to slightly shorter. In the type of *M. sylvatica* var. (?) *setiglumis* they were found to range from somewhat less than 1 mm. to slightly more than 2 mm. in length, being predominantly from slightly over 1 mm. to slightly under 2 mm. long.

In the following listing of California material known to the writer the lengths of awns terminating the glumes are given. The variation in their length makes it impossible to attribute our plants either to forma *ambigua* or forma *setiglumis* on the

¹ In Lamson-Scribner (1907, p. 20), in the treatment of *M. foliosa setiglumis* Scribn., in a quotation of the following sentence from the description by Watson (1871, p. 378): "glumes attenuate into a scabrous bristle, 2½-3" long;" the comma has been omitted following the word "bristle". This entirely changes the meaning of the statement by creating the impression that the scabrous bristle is 2.5 to 3 lines long rather than the glumes, as is implied in Watson's statement.

basis of this character. Because *M. foliosa* (R. & S.) Trin. forma *ambigua* (Torr.) Wiegand (1924, p. 1) is an older name than *M. mexicana* (L.) Trin. forma *setiglumis* (S. Wats.) Fernald (1943, p. 236), *M. mexicana* (L.) Trin. forma *ambigua* (Torr.) Fernald is the name to be used for our plants. The following list will also serve to illustrate additional California occurrences of this grass, which heretofore has been reported in our area only from near Orleans, Humboldt County (Munz & Keck, 1959, p. 1527, under the name *M. mexicana* forma *setiglumis*).²

COLLECTIONS. Chico, Butte Co., Stacey, Sept. 29, 1933: 1 mm. to slightly over 2 mm. (mostly somewhat below 2 mm.). Wilson Creek, near Orleans, Humboldt Co., Pollard, Aug. 19, 1947: slightly under 1 mm. to 1.75 mm. (mostly 1 mm. to 1.5 mm.). Sand bar, Fig Tree Riffle at Woodson Mine, Klamath River, Orleans, Humboldt Co., Pollard, Oct. 9, 1956: 0.25 mm. to 1.5 mm. (mostly slightly under 1 mm. to 1 mm.). Sand bars of Feather River North Fork near Belden, about 2300 ft. elevation, Plumas Co., Howell 34746 in 1959: 0.5 mm. to 1.5 mm. (mostly about 1 mm.). Gravelly bank, South Fork Eel River in Edward R. Hickey State Park, Mendocino Co., Rubtsoff 4222 in 1959: in one plant 0.5 mm. to 1.5 mm. (mostly somewhat less than 1 mm.), in several others 0.5 mm. to 2.5 mm. (mostly 1 mm. to 1.5 mm.).

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² In Munz & Keck (1959, p. 1527) no mention is made of the presence of an awn on the lemma in *M. mexicana* forma *setiglumis* which, as noted above, is the character separating the form from the species.

NOTES ON GRAMINEAE FROM THE
SIERRA NEVADA, CALIFORNIA

BY PETER H. RAVEN

University of California, Los Angeles

A study of certain recent collections of *Gramineae* from the Sierra Nevada of California has shown that the distribution of many species of that range is poorly understood, and that in many cases, few specimens have been cited to substantiate the ranges given in the various state floras. The grasses are, despite their great economic importance, among the least known and most neglected families of flowering plants of our flora. An important contribution to our knowledge of their Californian distribution was made by Beetle (*Hilgardia* 17:309–357, —1947), but a great deal of work remains to be done before our knowledge can be considered adequate. Our lack of knowledge of the grasses of the Sierra, of course, is due in part to the relative inaccessibility of parts of the range, which were consequently little visited by the early explorers.

In the notes that follow, numbers cited without collector are the field numbers of the writer, and specimens cited without reference to institution are deposited in the herbarium of the California Academy of Sciences, San Francisco. Other specimens which are cited from the various other herbaria of the state are indicated by the standard abbreviations (cf. Lanjouw and Stafleu, *Index Herbariorum*, ed. 4, —1959).

For the opportunity to spend a total of over six months in the higher parts of the range in Madera, Fresno, Tulare, and Inyo counties in the summers from 1950 to 1956, I am grateful to Oliver Kehrlein and to the members of the Sierra Club Outing Committee, by whom I was employed in various capacities on the annual Base Camp outings. This support enabled me to obtain a large number of collections from botanically interesting areas. In addition, I would like to express my appreciation to J. T. Howell, Curator of the Department of Botany, California Academy of Sciences, for his encouragement during the preparation of this work, and for making the facilities of the department available for my use while studying this material.

In the following notes, I will first list those grasses which I do not believe have been reported from definite stations in the Sierra Nevada, and then others which are of interest.

GRASSES NEW TO THE SIERRA NEVADA

AGROPYRON DESERTORUM (Fisch.) Schult. Rare escape on dry range lands about the margins of the Sierra: Beckwourth, 4900 feet, Plumas Co., *Howell 30749*; Convict Lake, Mono Co., *C. Webber in 1954*. Native of Russia.

AGROSTIS AVENACEA Gmel. *A. retrofracta* Willd. Known from two stations in the western part of Eldorado Co., where it grows in vernal moist spots and on burned areas: south end of Bass Lake, about 2 miles northwest of Clarksville, *Crampton 3508* (AHUC); Hollister Ranch, 3 miles west of Rescue, *Crampton 1122* (AHUC). Introduced from the Pacific area.

BROMUS ARVENSIS L. Locally established near corral, Reds Meadow Pack Station, 7500 feet, Madera Co., *3658A*. Native to Eurasia.

BROMUS PORTERI (Coul.) Nash. In addition to the localities cited by Munz (Calif. Fl., p. 1472, —1959), the following may be cited from the Sierra Nevada: Mosquito Flat, 10000 feet, Inyo Co., *Crafts & Halperin in 1932*; Lone Pine Lake, 10000 feet, Inyo Co., *M. Kerr in 1939*; Monache Creek, South Fork, 9800 feet, Tulare Co., *Howell 27297*.

FESTUCA TRACYI Hitchc. Cedar Ridge Road near Twain Harte, 3000-3500 feet, Tuolumne Co., *Howell 28991*.

PHALARIS ARUNDINACEA L. Rare in moist places and doubtfully indigenous: Mohawk, 4500 feet, Plumas Co., *Howell 28236*; 6 miles south of Tahoe Tavern, Placer Co., *A. L. Hormay in 1932* (AHUC).

PHALARIS TUBEROSA L. var. STENOPTERA (Hack.) Hitchc. Alta-ville, 1500 feet, Calaveras Co., *Howell 29860*. Probably Australian.

SPOROBOLUS CRYPTANDRUS (Torr.) Gray. In sandy place, with *Artemisia tridentata*, Andrews Camp, Bishop Creek, 9000 feet, Inyo Co., *Raven & Stebbins 152*. A collection from somewhat farther north is *A. Haig in 1951*, 5 miles south of Coleville, Mono Co. (AHUC).

SPOROBOLUS VAGINIFLORUS (Torr.) Wood. State Highway 20, between Grass Valley and Wolf, 2000 feet, Nevada Co., *M. A. Nobs in 1946* (AHUC). This inconspicuous grass, probably introduced from the eastern United States, may also be reported from 4 miles south of Shi-Lo-Ah Mineral Springs on Highway 99, Shasta Co., *R. Tofsrud in 1949* (AHUC). No earlier record from California is known to me.

ADDITIONAL NOTES

AGROSTIS LEPIDA Hitchc. Fairly common on dry flats, often under *Pinus contorta* var. *Murrayana* or *P. Balfouriana*, in sandy soil, southern Sierra Nevada from the South Fork of the San Joaquin River, northern Fresno Co., and the Rock Creek Lake Basin, northern Inyo Co., to the vicinity of Olancho Peak in Tulare and Inyo counties, 8000-11000 feet elevation; also in the higher San Bernardino Mountains.

ELYMUS \times *SAUNDERSII* Vasey. *Agropyron Saundersii* (Vasey) Hoover. This name can only be used informally, since Stebbins et al. (Amer. Journ. Bot. 33:341, —1946) have clearly shown that at least in the Sierra Nevada, it represents a collection of sterile F_1 hybrids between *Agropyron trachycaulum* (Link) Malte and *Sitanion Hystrix* (Nutt.) J. G. Smith. Hence, the name is contrary to the International Code of Botanical Nomenclature (Appendix I, Art. H3,—1956), which would require a combination of the two generic names for the hybrid. I do not intend to make this combination, however, because I do not feel a name is necessary for such sterile hybrids, because the generic division of the *Triticeae* is clearly unsatisfactory, and because material of this "species" from various parts of the western United States may be of different hybrid origin, as the morphology would suggest. In the Sierra, however, these plants are always found associated with the two parental species mentioned above, and have uniformly sterile pollen. They have frequently been collected in the Sierra Nevada of Alpine, Tuolumne, Madera, Fresno, Tulare, Mono and Inyo counties.

HORDEUM CALIFORNICUM Covas & Stebbins. Rare along the lower western foothills: Tuolumne Co. (Madroño 10:5—10, —1949); East Blue Lake, 8100 feet, Alpine Co., *Wolf* 5243; oak woodland, Ahwahnee property, 6 miles northwest of Oakhurst, Madera Co., *Crampton* 1474 (AHUC); Badger, 3100 feet, Tulare Co., *Howell & Barneby* 29282.

POA BULBOSA L. Becoming common in the foothills, and ranging south to Fresno Co. (collector unknown, AHUC).

STIPA COMATA Trin. & Rupr. Fairly common along the east side of the range in Inyo and Mono counties, but occasional in other parts: Fallen Leaf Lake, Eldorado Co., *Eastwood* 1058; Dardanelles, 5800 feet, Tuolumne Co., *A. Haig in* 1951 (AHUC); Mono Hot Springs, 6500 feet, Fresno Co., 4881; Piute Creek, about 9000 feet, Fresno Co., 4913; Kern River between

Junction Meadows and the hot springs, 7500 feet, 8382. Generally found in clumps on dry, well-drained slopes, often under *Pinus Jeffreyi*. On the eastern slope it occurs to 11,300 feet (Leschke in 1944).

STIPA PINETORUM Jones. Regarded as rare, but represented by about 50 Sierran collections made by C. W. Sharsmith, J. T. Howell, and the writer, which indicate the following distribution: rather uncommon, often on metamorphics but occasionally on granitics, and usually in unglaciated areas, from 7000 to 12,500 feet, but mostly above 11,000 feet, from Freel Peak, Eldorado Co., south to the vicinity of Mineral King on the Great Western Divide and along the crest to the vicinity of Mount Langley in Tulare and Inyo counties. It is most common in the higher parts of Mono, Inyo, and Tulare counties.

GRASSES GROW TALL IN CALIFORNIA. Unusually tall plants of three naturalized grasses in California have been found in Sonoma County by David L. Morgan. In May, 1956, in Petaluma, he collected a plant of *Avena fatua* L. var. *glabrata* Peterm. that was 1.9 m. tall and had blades nearly 2.5 cm. wide. In July, 1960, near Penngrove, Mr. Morgan found plants of *Holcus lanatus* L. that were 2 m. tall and of *Digitaria sanguinalis* L. that were 1.5 m. tall. The culm-lengths of these grasses exceed by at least 3 dm. the usual measurements given for them.

—J. T. HOWELL

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SAN FRANCISCO, CALIFORNIA
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LEAFLETS
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NOTES ON FRESH-WATER MARSH AND
AQUATIC PLANTS IN CALIFORNIA—II¹

BY PETER RUBTZOFF

The notes to follow are devoted to grasses and include new distributional records as well as other data which seem to be of interest. The herbaria of deposition of specimens cited are indicated as follows: CAS, California Academy of Sciences, San Francisco; DS, Dudley Herbarium, Stanford; UC, University of California, Berkeley. No indication means deposition at the California Academy of Sciences.

GLYCERIA OCCIDENTALIS (Piper) J. C. Nels. The western manna grass is known in the coastal region from British Columbia to California (to Marin County according to Howell, 1949, Mason, 1957, and Munz & Keck, 1959, and to northern San Mateo County, where it was collected in 1908 near Baden according to Thomas, 1961). It has generally been considered rare in the southern part of its range; however, collections made in Marin and Sonoma counties in recent years indicate that it is less infrequent there than was formerly supposed. Following is a list of specimens known to the writer from Sonoma and Marin counties.

SONOMA COUNTY: Perry Marsh, *Howell 21390* in 1945 (cited in Rubtzoff, 1953); Stony Point Marsh, *Rubtzoff 1789* in 1955; Ross Marsh, *Rubtzoff 1816, 1833, and 1883* in 1955; Fife Creek Marsh, *Rubtzoff 4334 and 4498* in 1960; Laguna de Santa Rosa east of Sebastopol, *Rubtzoff 4506* in 1960. MARIN COUNTY: 4 miles north of Bolinas, *Howell 22106* in 1946 (on this collection is based the information in Howell, 1949); marsh at head of Tomales Bay on Bear Creek above junction with Mill Creek, *Mason & Nobs 739* in 1949 (UC); pond 2 miles south of Olema, *Howell 32817* in 1957.

GLYCERIA ELATA (Nash) Hitchc. The tall manna grass, previously reported in the California Coast Ranges from Siskiyou County to Mendocino County (Mason, 1957; Munz & Keck, 1959) and from Sonoma County (Rubtzoff, 1953) has been collected also in Lake County: mouth of a streamlet emptying from the north into the northern lake of Blue Lakes, *Rubtzoff 1274* in 1952; northeast slope of Mt. St. Helena, State Hwy. 29, 5 miles south of Middletown, *Crampton 1515* in 1953.

¹ The first part of the Notes, devoted to Monocotyledons preceding the *Gramineae* and containing a map showing marshes in southern Sonoma County with a list of their names used in these studies, appeared in *Leaflet West. Bot.* 9(5): 73-78 (1960).

In Sonoma County *G. elata* has been reported from a single locality, the Pitkin Marsh (Rubtzoff, 1953), which was considered to be the southernmost known station of this plant in the Coast Ranges. In 1960 it was collected in the Laguna de Santa Rosa area east of Graton (an area slightly farther south than the Pitkin Marsh) where it grows in shaded, moist ground along a brook: Rubtzoff 4414 and 4500.

ERAGROSTIS HYPNOIDES (Lam.) B.S.P. The creeping love grass, reported in the Coast Ranges from Lake County to Siskiyou County (Mason, 1957) and from Santa Cruz County (Hesse, 1959; Thomas, 1961), has also been collected in Sonoma County: sand bar of Russian River at Odd Fellows Park above Guerneville, Howell 30913 in 1955.

Four other species of *Eragrostis* have been found growing together on moist, sandy banks of the Russian River at Vacation Beach, 1.5 miles downstream from Guerneville. These are: *E. Orcuttiana* Vasey, *E. megastachya* (Koeler) Link [*E. cilianensis* (All.) Lutati], *E. diffusa* Buckl. (Rubtzoff 1517A, 2864, 3932 in 1954, 1956, and 1958), and *E. poaeoides* Beauv. (Rubtzoff 3931 in 1958). *Eragrostis diffusa* has also been collected by Mr. Howell on the Russian River bottom near Guerneville (32980 in 1957). It is considered to be a rare plant in the Coast Ranges and has only recently been reported for Marin County (Howell, 1959, p. 55). *Eragrostis poaeoides*, of which only one plant was found at the above station, has been reported for our state as sparingly introduced from Europe in southern California (Munz & Keck, 1959).

POLYPOGON AUSTRALIS Brongn. When I was working on the flora of the Pitkin Marsh in Sonoma County, I made a collection of *Polypogon* which I did not know where to place. Finally I placed it, with some hesitation, under *P. interruptus* H.B.K., because I found at the herbarium of the California Academy of Sciences matching specimens filed under that species (Rubtzoff, 1953). After collecting more material of this plant in other marshes in Sonoma County, I decided to attack the problem more critically. At the herbaria of the California Academy of Sciences and the University of California were found a number of California specimens of the same plant filed under *P. interruptus*. There appeared to be also a number of specimens from Chile and Argentina matching our plants very closely, which were filed under *P. australis* Brongn.

Polypogon australis is listed by Agnes Chase (Hitchcock, 1950) as introduced at Bingen, Washington, being a native of Chile and Argentina. However, one of the key characters given in this reference does not correspond to what we actually find in the material from South America filed under *P. australis* as well as in the California plants under consideration, namely, the glumes of *P. australis* are supposed to be 1.5 to 2 mm. long as contrary to 2.5 to 3 mm. in *P. interruptus*. In the above material from South America and California, however, they are longer than that, being generally as large or larger than in *P. interruptus*.

I wrote to Mr. Jason R. Swallen at the U.S. National Museum about these findings asking for his opinion and forwarding him two duplicates of the plants from Sonoma County. Mr. Swallen kindly replied that "There has been a certain amount of confusion regarding the identity of this species. The two specimens cited by Mrs. Chase in the last edition of the Manual I think are some other species than *P. australis*, although I have not determined which one. I think the two specimens you have sent are perfectly good *P. australis*. It differs from *P. interruptus* in the shorter ligule, usually not over 2 mm. long, the relatively shorter blades, the lax purplish panicle, with slender, more or less tangled awns." Mr. Swallen also wrote that he had examined specimens filed under *P. interruptus* in the U.S. National Herbarium and found that the following California specimens should be referred to *P. australis*: *Hall 1419* from Lytle Creek Canyon; *Hansen 622* from Amador County; *Heller 10775* from Butte County; *Coville & Funston 706* from Death Valley; *Parish 2239* from San Bernardino; *Chase 5536* from San Bernardino. The three last mentioned of the above specimens I have not been able to locate in the local herbaria. Some of the above specimens are discussed in more detail later, in the listing of California specimens known to me.

With the information obtained from Mr. Swallen I checked again the *Polypogon* material at the herbaria of the California Academy of Sciences and the University of California, and at Stanford, and found a number of specimens of *P. australis* filed under *P. interruptus* and *P. monspeliensis*. *Polypogon australis* strongly resembles *P. interruptus* in the shape of the glumes. The most clearcut character for separating it from *P. interruptus* seems to be the relative length of the ligules. In

P. australis the ligule is short, usually not over 2 mm. long (although it may be longer in robust specimens), about as long as wide or shorter, frequently being represented by just a narrow fringe. In *P. interruptus* the ligule is relatively much longer, usually about 1.5 to 2 times as long as wide. However, a few specimens have been seen which, although resembling *P. interruptus* in other respects, have relatively short ligules similar to those of *P. australis*.² The other distinguishing characters described in the letter of Mr. Swallen, to which the generally much longer awn on the glumes of *P. australis* may be added, are much more variable and overlap in the two species. The purple tinge in the panicle of *P. australis*, although mostly present and quite strong, is sometimes lacking. On the other hand, in *P. interruptus* the panicle may occasionally be purple-tinged.

Polypogon australis has been collected with us mostly in southern California and in the western foothills of the Sierra Nevada, but occasionally also in the Mojave Desert area, the Central Valley, and the North Coast Ranges. It occurs at low and middle elevations in moist and marshy ground and in shallow water of marshes, on streambanks, and along irrigation ditches.

Following is a list of specimens of *Polypogon australis* Brongniart (*P. crinitus* Trin., not Nutt.; *P. interruptus* var. *crinitus* Hack.) known to me from Pacific North America:

BAJA CALIFORNIA: Cedros Island, *Mason 2016* in 1925 (CAS, DS; part of the sheet at CAS is *P. semiverticillatus*).³

SOUTHERN CALIFORNIA. SAN BERNARDINO COUNTY: irrigation ditch at Lugonia,⁴ *Parish 2090*, June 18, 1889 (DS); near San Bernardino, *Parish*, May 25, 1891 (DS), *Parish*, May 10, 1894 (CAS), *Parish 4763*, May 8, 1901 (DS); Lytle Creek, 2500 ft., *Hall 1419*, May 30, 1900 (UC); mouth of Lytle Creek Canyon, *Hall 1419*, June, 1900 (UC; cited in letter from Mr. Swallen); City Creek, San Bernardino Valley, el. about 300 m., *Parish 11201*, May 17, 1917 (UC); hills above Arrowhead Hot Springs near San Bernardino, 1800 ft., *Spencer 1142*, May 17, 1919 (CAS). Besides, Mr. Swallen lists in his letter *Parish 2239* and *Chase 5536* from San Bernardino, which I have not been able to locate in local herbaria. RIVERSIDE COUNTY: vicinity of Riverside,

² Mr. Swallen lists in his letter *Hansen 622* as *P. australis*. The plant, from Jackson Gate, Amador County, 1500 ft. el., in 1893, as represented by the sheets at DS and UC, is very shortly awned and has the general appearance of *P. interruptus*. However, it has the short ligules peculiar to *P. australis*. Possibly the sheet seen by Mr. Swallen represents typical *P. australis*, or perhaps he has placed the plant under *P. australis* on the basis of the ligule character only.

³ This specimen was cited under *P. monspeliensis* by Eastwood (1929, p. 425).

⁴ For the location of this area in the vicinity of San Bernardino see Gudde, California Place Names, University of California Press, 1960, under "Lugo."

1000 ft., *Hall 1384*, June, 1900 (UC); Riverside, *Hall 1384*, May 29, 1900 (DS). ORANGE COUNTY: Fullerton, 175 ft., *Wolf 3723* in 1932 (DS, UC).

MOJAVE DESERT REGION. INYO COUNTY: Cottonwood Canyon, Panamint Mountains, *Coville & Funston 971*, May 28, 1891 (DS). Besides, Mr. Swallen lists in his letter *Coville & Funston 706* from Death Valley, which I could not find in local herbaria.

SIERRA NEVADA FOOTHILLS. STANISLAUS COUNTY: Knights Ferry, *Hoover 1026* in 1936 (UC; this specimen was already determined as *P. australis* by Dr. Hoover). TUOLUMNE COUNTY: Woods Creek, 1 mile northwest of Jacksonville, 1000 ft., *Carter 542* in 1934 (UC; part of the sheet is *P. interruptus*); 1 mile northeast of Big Oak Flat, 3300 ft., *Belshaw 182* in 1935 (UC); part of the sheet is *P. interruptus*. CALAVERAS COUNTY: Copperopolis, 1000 ft., *Tracy 5595* in 1921 (UC); 2 miles south of Jenny Lind, 400 ft., *Yates 5167* in 1935 (UC). AMADOR COUNTY: New York Falls, 2000 ft., *Hansen 625*, May 1892 (DS; the duplicate of this number of Hansen at UC, labeled "near Jackson, Amador Co., 1892," is *P. interruptus*); Agricultural Station, 2000 ft., *Hansen 1744*, June 17, 1896 (UC; part of the sheet is *P. maritimus*). EL DORADO COUNTY: 5 miles northeast of Placerville, *Hormay*, July 7, 1932 (UC). PLACER COUNTY: south of Newcastle, 1000 ft., *French 41* in 1933 (UC); near Auburn, bank of branch of Rubicon River, *Beetle 2724* in 1941 (CAS, DS, UC). NEVADA COUNTY: west of Greenhorn Creek, 3000 ft., *Raven 8047* in 1954 (CAS). BUTTE COUNTY: Table Mountain Olive Ranch north of Oroville, *Heller 10775* in 1913 (DS, UC; cited in letter from Mr. Swallen); hills 8 miles north of Oroville, *Heller 11419* in 1914 (CAS, DS, UC).

CENTRAL VALLEY. SAN JOAQUIN COUNTY: French Camp Road near Summer Home, *Stanford 1469* in 1930 (CAS; part of the sheet is *P. interruptus*). BUTTE COUNTY: seed from Biggs, grown in greenhouse at Berkeley, *Kennedy*, May 15, 1915 (CAS).

COAST RANGES. SONOMA COUNTY: Skaggs Springs Road about 10 miles from Stewarts Point, *Bufford 385* in 1936 (UC); Pitkin Marsh, *Rubtzoff 327* in 1951 (CAS, DS); Duncans Mills Marsh, *Rubtzoff 2044* in 1955 (CAS); Willow Creek Marsh, *Rubtzoff 4094* in 1959 (CAS). MENDOCINO COUNTY: coast at Usal, *Wolf 1301* in 1927 (DS); mouth of Noyo River according to Baker (1954, p. 7). HUMBOLDT COUNTY: South Fork Eel River, Hartsook's, *Cantelow*, May 29, 1961 (CAS); near Arcata, 0-50 ft., *Person*, May 19, 1932 (UC).

POLYPOGON MARITIMUS Willd. This beard-grass, native in southern Europe, north Africa, the Near East, and Turkestan, has been reported from Tuolumne and Amador counties in the Sierra Nevada foothills, from Butte County in the Sacramento Valley, and from Humboldt, Lake, Napa, Sonoma, and Marin counties in the Coast Ranges (Howell, 1949; Baker, 1954; Mason, 1957; Munz & Keck, 1959). It has also been collected in the following additional areas in the state. Sierra Nevada foothills: Knights Ferry, Stanislaus Co., *Howell 28975A* in 1953. Cascade foothills: mouth of Squaw Creek, Shasta Co., 800 ft., *Kraebel 12* in 1934 (UC). Sacramento Valley: levee at Tule,

near College City, Colusa Co., *Stinchfield* 287 in 1916 (UC; part of the sheet is *P. monspeliensis*). Coast Ranges: dry creek bed of Arroyo Mocho, Mt. Hamilton road from Livermore (probably Alameda Co.), *Raven* 58 in 1948; Upper Buckhorn Canyon, La Panza Range, San Luis Obispo Co., 2000 ft., *Twisselmann* 2171 in 1955.

Baker (1954, p. 7) reported the plant for Sonoma County from "Bodega Highway near coast." Since the plant seems to be uncommon in that part of the state, it may be of interest to list here three additional collections I have made in Sonoma County: Russian River bottom at Vacation Beach, near Guerneville, *Rubtzoff* 1547 in 1954 (single depauperate plant); vernally wet borderland of Austin Creek Marsh, *Rubtzoff* 4445 in 1960; moist shore of Bennett Mountain Lake, *Rubtzoff* 4628 in 1961.

ALOPECURUS AEQUALIS Sobol. This circumboreal foxtail, according to Mason (1957), is known in the Coast Ranges as far south as Mendocino County. It has also been collected on marshy shores and in shallow water of Bennett Mountain Lake in Sonoma County: *Rubtzoff* 1994, 2100, and 4635 in 1955 and 1961. These collections seem to represent the typical plant, their characters agreeing with those given in Hitchcock (1950).

In southern coastward Sonoma County and on Point Reyes Peninsula in Marin County collections of *A. aequalis* have been made which deviate considerably from the typical plant and cannot be identified using Hitchcock (1950). They are considered here to represent a new variety.

Alopecurus aequalis Sobol. var. *sonomensis* Rubtzoff, var. nov. Plantae robustiores culmis paniculisque usque ad 7.5 dm. longis; laminis usque ad 7.5 mm. latis; paniculis crassiusculis, 2.5–9 cm. longis, 0.4–0.8 cm. latis; arista ad vel paulum infra medium lemmae adnexa, 1–2.5 mm. glumae longiore.

Plants generally more robust and more erect than in var. *aequalis*; culms (with panicle) about 30–75 cm. long, mostly straight or weakly geniculate near base and erect, rarely more geniculate and ascending; leaf-blades to 7.5 mm. wide; panicle generally relatively less slender than in var. *aequalis*, thickish, 2.5–9 cm. long, 4–8 mm. wide; spikelets usually violet-gray or purplish-gray tinged, especially toward the tip, which is not commonly the case in var. *aequalis*; awn straight, longer than in var. *aequalis*, exserted 1–2.5 mm., attached near or a little below the middle.

Plants occasional in shallow water and in marshy or moist ground, mostly in the open.

TYPE: *Rubtzoff* 1821, from Guerneville Marsh, Sonoma County, California, May 7, 1955 (Calif. Acad. Sci. Herb. No. 425415).

COLLECTIONS. SONOMA COUNTY: Bloomfield, Congdon, June 6, 1880 (DS); Pitkin Marsh, Yates 5603 in 1936 (UC), Howell 20899 in 1945 (CAS),⁵ Rubtsoff 200 in 1951 (CAS);⁵ Cunningham Marsh, Howell 23229 in 1947 (CAS);⁵ Guerneville Marsh, Rubtsoff 1821 in 1955 (CAS, type); Ross Marsh, Rubtsoff 1835 and 1882 in 1955 (CAS); Duncans Mills Marsh, Rubtsoff 1957 and 2045 in 1955 (CAS); Occidental Marsh, Rubtsoff 3332 in 1957 (CAS); Freestone Marsh, Rubtsoff 4083 in 1959 (CAS). MARIN COUNTY: Bear Valley, Davy 4353, Aug., 1898 (UC);⁶ between Bolinas radio station and Rio Honda, Howell 21358 in 1945 (CAS, UC);⁷ near radio station on road to Point Reyes, Leschke, June 20, 1948 (CAS),⁷ Howell 28322 in 1952 (CAS).

A variety with awns exerted 1.5–2 mm. is known from eastern Asia as *A. aequalis* var. *amurensis* (Komar.) Ohwi [Bot. Mag. Tokyo 55: 360,—1941; *A. amurensis* (Komar.) Komar., Bull. Jard. Bot. Pétersb. 16: 151,—1916]. However, according to Ovczinnikov (1934, p. 158), the awn in *A. amurensis* is attached in the lower third of the lemma. The few specimens I have seen from Japan and Pacific Russia have the awn attached one-third from base of lemma. In our plants, however, the awn is attached about or somewhat below the middle of lemma, as in typical *A. aequalis*. Besides, our variety is apparently more robust than var. *amurensis*, which seems to have dimensions similar to those of typical *A. aequalis*.

Davy, in Jepson's Flora of Western Middle California (1901, p. 41), treated his collection from Bear Valley in Marin County as *A. geniculatus* L. Howell adopted this interpretation of the plant in Marin Flora (1949, p. 83), and Mason, in Flora of the Marshes of California (1957, p. 135), probably based the information on the occurrence of *A. geniculatus* in Marin County on these sources. The basis for this interpretation was obviously the much longer awn found in Marin County plants as compared to that in typical *A. aequalis*. In this respect our plants approach *A. geniculatus*. However, the awn is straight (not twisted or bent as in *A. geniculatus*), shorter than in the latter species, and inserted near or somewhat below the middle of lemma (close to the base of the lemma in *A. geniculatus*). Moreover, the anthers in our plants are orange-colored and to 1 mm. long, as in typical *A. aequalis* (generally paler and 1.5–2 mm. long in *A. geniculatus*). It is interesting to note that Davy's specimen from Bear Valley (identified as *A. geniculatus*) was annotated in 1950 by G. T. Robbins as "approaching *A.*

⁵ Cited in Rubtsoff (1953, p. 152) under *A. aequalis*.

⁶ Cited in Davy (1901, p. 41) under *A. geniculatus*.

⁷ The treatment of *A. geniculatus* by Howell (1949, p. 83) is based on these specimens.

aequalis!", with the comment that awns are shorter than usual (in *A. geniculatus*) and attached near middle of lemma.

In the list of Pitkin Marsh plants (Rubtsoff, 1953, p. 152), I cited some specimens from Sonoma County under *A. aequalis*, which at that time, I did with hesitation, since it was not possible to key the plants to that species because of the long awn when using Hitchcock's Manual (1950).⁸ The present study shows that these plants and others collected in Sonoma County are identical with Marin County plants discussed above.

As the result of the above considerations, *A. geniculatus* is to be excluded from the flora of Marin County, and the southward Coast Range distribution of *A. aequalis* should be extended to reach Marin County, not, however, as the species, but as the above described var. *sonomensis*, which would seem to be restricted to southern coastward Sonoma County and Point Reyes Peninsula in Marin County.

ALOPECURUS GENICULATUS L. The presently known southern distributional limit of *A. geniculatus* in the Coast Ranges is to be placed in Sonoma County where I have collected it in the Willow Creek Marsh: Rubtsoff 4090 in 1959.

ALOPECURUS CAROLINIANUS Walt. This species, reported as "weed in vineyard in Fresno Co." (Munz & Keck, 1959), has been collected at the following additional stations: near Kings River Ferry, Dudley, April 19, 1903 (DS); San Joaquin River bridge east of Los Banos, Merced County, Abrams 10762 in 1925 (DS); Bass Lake, Madera County, Eastwood & Howell 5407 in 1938 (CAS).

CRYPISIS NILIACA Fig. & De Not. The prickly grass, a native of Egypt and southwestern Asia, is in the process of spreading in our state (Hitchcock, 1950). Since its known distribution in the Coast Ranges is of a scattered nature, it may be of interest to cite here specimens from Sonoma County, collected by the writer in August and September, 1958, in vernal wet, but at the time dry, ground along the Laguna de Santa Rosa: north of Sebastopol, 3869; north of Cunningham, 3980.

HELEOCHLOA SCHOENOIDES (L.) Host. The swamp timothy, native in southern Europe, north Africa, the Near East, and Turkestan, has been reported in the Coast Ranges from Lake and Napa counties (Mason, 1957; Munz & Keck, 1959). Besides, it has been collected in Alameda County (Mt. Eden, Oliver,

⁸ It is interesting to note that Fernald (1950, p. 167) in characterizing *A. aequalis* allows for plants with awns exerted up to 2 mm.

Sept. 1945) and at the following stations in Sonoma County: Russian River bottom near Guerneville, *Howell* 32979 in 1957; Laguna de Santa Rosa northeast of Graton, about 0.5 mile north of Guerneville Road crossing, *Rubtzoff* 4008 in 1958; Laguna de Santa Rosa near Trenton, *Rubtzoff* 4572 in 1960.

LEPTOCHLOA FASCICULARIS (Lam.) Gray. The bearded sprangletop has been recently collected in Sonoma County: Russian River bottom at Vacation Beach, near Guerneville, *Rubtzoff* 2851 in 1956; Russian River bottom near Guerneville, *Howell* 32978 in 1957; Laguna de Santa Rosa northeast of Graton, about 0.5 mile north of Guerneville Road crossing, *Rubtzoff* 4006 in 1958. These are the first records of this grass from the Coast Range region, except for the record of a weedy occurrence in San Francisco (*Howell*, 1935; *Mason*, 1957; *Howell et al.*, 1958; *Munz & Keck*, 1959; *Thomas*, 1961). It may be of interest to note that it has been recently collected as a weed also in Santa Barbara County: Southern Pacific Railroad yards, Santa Barbara, *Pollard*, June 25, 1957.

PHALARIS TUBEROSA L. var. *STENOPTERA* (Hack.) Hitchc. Hard-ing grass was collected in 1959 in the Willow Creek Marsh in Sonoma County, *Rubtzoff* 4137. Originally sown by the farmer along a section of the marsh, it has apparently become established and is spreading to other parts of the marsh. Previously this forage grass has been reported as an escape from cultivation, mostly in moist ground, in Humboldt, Colusa, Marin, San Francisco, and San Mateo counties (*Howell*, 1949; *Mason*, 1957; *Howell et al.*, 1958; *Munz & Keck*, 1959; *Thomas*, 1961).

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A NEW ERIOGONUM FROM THE KLAMATH MOUNTAINS, CALIFORNIA

BY JOHN THOMAS HOWELL
California Academy of Sciences

AND

RIMO BACIGALUPI
Jepson Herbarium, University of California

Eriogonum hirtellum Howell & Bacigalupi, spec. nov. Planta perennis ex rhizomate plus minusve lignoso; foliis rosulatis ovatis, ellipticis vel late oblanceolatis usque ad basim versus angustatis, hirtellis vel paginis tantum interdum glabrescentibus, nec arachnoideis nec glandulosis; pedunculo 8–25 cm. alto erecto gracili subglabro nudo haud ramoso sub fasciculo florifero terminali subcapitato ex involucris pluribus et ramulis brevibus constante; capitulo verticillo bractearum circa 5 anguste oblongarum hirtellarumque suffulto; involucris obconicis 5–6 mm. longis dentibus 5 vel 6 circa 1 mm. longis erectis supereminentibus; pedicellis exsertis valde hirtellis; perianthio luteo basi haud stipitato extus ad basim versus dense albido-piloso; segmentibus exterioribus circa 3 mm. longis latisque supra basim angustam abrupte ampliatis subrotundatisque; segmentibus interioribus oblongis circa 2.5 mm. longis 1 mm. latis; antheris flavis, filamentis basi hirsutulis; ovario itidem hirsutulo; fructu hucusque ignoto.

Plant perennial with rather woody long-creeping rhizomes that are

covered with old leaf-bases and end in small clusters of leaves; leaves yellowish-green, ovate, elliptic, or broadly oblanceolate, 0.5–1.5 cm. long, 0.3–0.8 cm. wide, obtuse or rarely subacute, narrowed at the base into a flattened petiole 0.3–2 cm. long, the petioles and blades hirtellous or the blades sometimes glabrescent, neither arachnoid nor glandular hairs present; peduncle 8–25 cm. tall, erect, slender, leafless and unbranched below the terminal, globose, head-like cluster of several involucre, subglabrous or very sparingly hirtellous, also very slightly viscidulous near the top, the head subtended by a circle of about 5 narrowly oblong hirtellous bracts that tend to be united at the base, the head consisting of a sessile involucre and 1–3 very short (up to 2 mm. long) branches, each bearing oblong-linear bracts and 1–3 involucre, the bracts hirtellous, the abbreviated branches subglabrous; involucre obconic, 5–6 mm. long, 5- or 6-toothed, the teeth broadly triangular, about 1 mm. long, erect, the involucre yellowish, hirtellous outside, glabrous inside, the pedicels exerted and conspicuously hirtellous, the bractlets short, filiform, barbellate; perianth not stipitate at base, bright yellow, densely white-pilose outside near the base, glabrous within, the outer segments about 3 mm. long, much-broadened and sub-rotund above a claw-like base, to 3 mm. broad, the inner segments oblong, about 2.5 mm. long and about 1 mm. wide; anthers yellow, round, about 0.5 mm. long, filaments hirsutulous at the base; ovary hirsutulous, styles glabrous; fruit and fruiting perianth not known.

Eriogonum hirtellum is known only from the serpentine ridge-top between Indian Creek drainage (North Fork Twin Valley Creek) and Illinois River drainage (Dunn Creek) at an elevation of 5300 feet, on the boundary line between Del Norte and Siskiyou counties, Klamath Mountains, California, where it was collected by Bacigalupi, No. 7458, July 20, 1960 (type, Calif. Acad. Sci. No. 425414; isotype, Jepson Herbarium No. 25874). The plants of *E. hirtellum*, together with those of *E. ternatum* Howell, grew in scattered clumps on exposed rocky slopes above a Canadian Zone forest of *Picea Breweriana* and *Abies magnifica*.

With its head of yellow pubescent flowers and rosettes of yellow-green hirtellous leaves, *E. hirtellum* is quite distinct from all known species in *Eriogonum*. It would seem to find its closest relative in *E. latens* Jepson, a plant from the desert slopes of the southern Sierra Nevada and the mountains of adjacent Nevada. *Eriogonum hirtellum* and *E. latens* resemble each other in general aspect of habit, in the critical character of pubescence, and in the congested head-like inflorescences, but they differ in the color and shape of perianth-segments and in details of pubescence of floral structures. Further, it may be conjectured that both of these species may be distantly derived

from the less localized, chiefly Cascadian *E. pyrolaefolium* Hook.

Although these three species are to be placed in the subgenus *Eueriogonum*, nevertheless they lack or weakly exhibit the stipe-like perianth-base characteristic of the subgenus. This is particularly true of *E. latens* and *E. hirtellum* whose flowers are as nonstipitate as any in the subgenus *Oregonium* where they would be referred if reliance were placed on this floral character alone. These two species, however, have neither the ternate bracts nor the angled involucre generally characteristic of the subgenus *Oregonium* and their subcapitate inflorescence is distinctly umbelliform in structure even if it is so compactly reduced.

The phytogeographic interrelation of the southern Sierra Nevada and the Klamath Mountains has been pointed out on numerous occasions; with the discovery of *E. hirtellum* in the Klamath Mountains, another floristic link between the two regions has apparently been forged.

NOTES ON LINANTHUS OBLANCEOLATUS

BY PETER H. RAVEN

University of California, Los Angeles

Linanthus oblanceolatus, a distinctive endemic of the southern Sierra Nevada, is not uncommon, at least locally, growing on dry slopes and flats, generally with *Pinus Murrayana* Grev. & Balf. or occasionally with *P. albicaulis* Engelm. or *P. Balfouriana* Grev. & Balf. It is often found in colonies in sun-lit clearings. This species has a more or less continuous distribution on the west side of the Sierra Nevada from the South Fork of the San Joaquin River to the Great Western Divide and the vicinity of Olancha Peak, ranging from 8000 to 11,500 feet elevation, chiefly west of the crest in Fresno and Tulare counties, with a single station known from the eastern slope in Inyo County. The following citations of specimens in the herbarium of the California Academy of Sciences will amplify the narrow distribution given by Jepson (Fl. Calif. 3: 217, —1943):

FRESNO COUNTY: Pioneer Basin, about 10,500 ft., *Howell 22664*; lake south of Silver Pass, 10,200 ft., *Raven 6030*; Second Recess, 8800 ft., *Raven 5739*; North Fork of Bear Creek, 10,700 ft., *Raven 5965*; Hilgard Branch of Bear Creek, 9800 ft. (no collection); east side of Hell-for-Sure Pass, 10,500 ft., *Raven 5082*.

TULARE COUNTY: Wright Creek, at about 11,200 ft., *Raven 8363*; Tyndall Creek, *Campbell in 1916*; Tyndall Creek Basin west of Tyndall Creek, 11,500 ft., *Kamb 1895*; near Soldier Lake, 11,000 ft., *Howell 26160*; Rock Creek, 10,500 ft., *Howell 26217*; Siberian Pass Trail, 11,000 ft., *Howell 26008*; pass north of Hessian Meadows, 9000 ft., *Howell 27113*; trail from Bakeoven Meadows to Templeton Meadows, about 8000 ft. *Howell 27001A*; Lost Canyon, about 10,000 ft., *Howell 17777*; Eagle Lake Trail, near Mineral King, *Howell 17183*.

INYO COUNTY: Cottonwood Lakes, 11,100 ft., *Howell 25466*.

As to the name for this species, I follow J. T. Howell (Leaff. West. Bot. 6: 217, —1952) for the most part. Under the present (1956) edition of the International Code (Ch. II, Sect. 4, Art. 12), "A name of a taxon has no status under this Code unless validly published." Hence, despite an article by H. L. Mason (*Madroño* 9: 253, 254, —1948), the earlier publication of *Linanthus oblanceolatus* Eastwood as a *nomen nudum* by Baker does not, under the Code, make the specific epithet *oblanceolatus* invalid for use in the genus *Linanthus*.

However, the species cannot simply be known as *L. oblanceolatus* Eastwood ex Jepson (Man. Fl. Plants Calif., p. 806, —1925) as maintained by Howell (loc. cit.), because there were two earlier validly published names at the specific level, *Gilia oblanceolata* Brand and *G. tularensis* Brand (Das Pflanzenr. IV. 250: 136, —1907). Even though no reference is made by Jepson (loc. cit.) to the basonym *Gilia oblanceolata* Brand, he cites *G. tularensis* Brand in synonymy, and this indicates that he is placing Brand's *Gilia oblanceolata* in the genus *Linanthus*. That this is the case is clearly indicated in the Flora of California (Jepson, Fl. Calif. 3: 218, —1943), where the synonymy is given in full.

Although neither of Brand's names has priority over the other, Jepson thus made the first selection and is to be followed as to the choice of the epithet *oblanceolatus*. Since the type of "*Linanthus oblanceolatus* Eastwood MS." is not given by Brand or by Jepson, the type of *Linanthus oblanceolatus* (Brand) Eastwood ex Jepson is exactly that of *Gilia oblanceolata* Brand, Hall & Babcock 5554. Thus Howell's (loc. cit.) contention that *Linanthus tularensis* (Brand) H. L. Mason subsp. *Culbertsonii*

(Brand) H. L. Mason is an exact synonym of "*Linanthus oblancoelatus* Eastwood ex Jepson" is wrong, and if that taxon is to be recognized, the appropriate combination would have to be made.

The writer is indebted to Dr. H. W. Rickett of the New York Botanical Garden for his helpful discussion of the nomenclatorial situation.

SOME TYPE MATERIAL IN A COLLECTION OF J. G. LEMMON'S PLANTS

BY DAVID B. DUNN

University of Missouri, Columbia

An old scrapbook of specimens collected by J. G. Lemmon was uncovered recently in the Herbarium of the University of Missouri. The pages were aged almost to the point of crumbling but the specimens were mostly in good condition. There were 166 specimens worth remounting and accessioning (UMO 47421 to 47586). Among these were quite a large number of specimens with formally printed labels, several of which bore "n. sp." after the epithet. The type descriptions bear out the fact that Lemmon was indeed the collector of the material utilized to describe the several species. The inscription entered at the front of the scrapbook was as follows:

PLANTS OF CALIFORNIA

Characteristic or rare specimens collected during the years of 1872 to 1879 from the plains of the Colorado to the peaks of the Sierra, by J. G. Lemmon, Sierra Valley.

Mounted on these pages by his dear lady friends of the Post Office Arcade and the names and habitat inscribed by his botanical sister 'Amabilis', Miss Sara A. Plummer.

Presented with profound regards to Dr. S. E. Pearre, Oakland, Feb. 1880.

A few specimens from the Maricopa area, "Arizona Territory," March, 1880, were also mounted in the scrapbook, after the inscription had been entered, and they too proved to be important early material. Most of the 166 remounts have been checked against Abrams' and Munz's floras and annotated as to present names. The following list of 22 appear to be worth reporting. A complete list has been made, however, in case investigators may be working with taxa involving species in which a Lemmon collection was possibly involved in the original description.

In the following list the name and locality on the original label are given with the publication reference, while the name currently in use for the taxon, together with notes, is also given. Most of these specimens are isotypes or paratypes, although some are certain to be branches from the specimen used as the type.

CHEILANTHES COOPERAE Eaton, n. sp. Santa Inez Mts. & Mt. Slover. Bull. Torr. Bot. Club 6:33 (1877). One of the two collections cited.

CHEILANTHES VISCIDA Davenport, n. sp. Downieville Buttes & Bluffs of White R. Bull. Torr. Bot. Club 6:191 (1877). Part of the Lemmon collection is cited in the type description.

NOTHOLAENA LEMMONII Eaton. Santa Catalina Mts., Arizona. Bull. Torr. Bot. Club 7:63 (1880). *Cheilanthes Lemmonii* (Eaton) Domin, Bibl. Bot. 85:133 (1933).

SILENE LEMMONI Wats., n. sp. Sierra Valley & Webber L. Proc. Amer. Acad. 10:342 (1875). Cited.

ANEMONE MULTIFIDA DC. Mts. Stanford (Castle Peak), Lassen & Scott. *A. Drummondii* Wats., Bot. Calif. 2:424 (1880). One of several collections cited.

RANUNCULUS LEMMONII Gray, n. sp. Sierra, Webber & Truckee Valley. Proc. Amer. Acad. 10:68 (1874). *R. alismaefolius* Geyer in Benth. var. *Lemmonii* (Gray) Benson, Amer. Journ. Bot. 23:176 (1936).

RANUNCULUS OXYNOTUS Gray, n. sp. Mt. Stanford (Castle Peak) & Mts. east of Sierra Valley. Proc. Amer. Acad. 10:68 (1874). *R. Eschscholtzii* Schlecht. var. *oxynotus* (Gray) Jeps., Fl. Calif. 1:537 (1922).

CORYDALIS CASEANA Gray, n. sp. Sierra Valley. Proc. Amer. Acad. 10:69 (1874). Cited.

DICENTRA PARVIFLORA Gray, n. sp. Described as *D. pauciflora* Wats., Bot. Calif. 2:429 (1880). Cited from Castle Peak.

DENTARIA CALIFORNICA Nutt., n. sp. Indian Valley. Described as var. *pachystigma* Wats., Proc. Amer. Acad. 14:289 (1879). Raised to *D. pachystigma* Wats., Syn. Fl. N. Amer. 1:155 (1895).

DRABA AUREA Vahl. Lassen's Peak. Described as *Draba aureola* Wats., Bot. Calif. 2:430 (1880).

IVESIA WEBBERI Gray, n. sp. Sierra Valley. Proc. Amer. Acad. 10:71 (1874). Cited.

ASTRAGALUS PULSIFERAE Gray, n. sp. Sierra Valley to Pyramid Lake. Proc. Amer. Acad. 10:69 (1874). One of the two collections cited.

LUPINUS ONUSTUS Wats., n. sp. Indian Valley to Shasta. Proc. Amer. Acad. 11:127 (1876). Mrs. M. E. Ames cited first; probably both collections made jointly.

VIOLA LOBATA Benth. var. INTEGRIFOLIA Wats., n. var. Mohawk Valley, California. Bot. Calif. 1:57 (1876). Cites var. as from Sierra County. Our label clears up the lack of data referred to by Abrams (Fl. 3:126).

CYCLADENIA TOMENTOSA Gray. Plumas County, California. Bot. Calif. 1:474 (1876). *C. humilis* Benth. var. *tomentosa* (Gray) Gray, Syn. Fl. N. Amer. ed. 2, 2:400 (1886). Cited by Gray.

ERITRICHIMUM TORREYI Gray. Webber Lake, Mariposa Grove. Proc. Amer. Acad. 10:58 (1874). *Plagiobothrys Torreyi* (Gray) Gray, Proc. Amer. Acad. 20:284 (1885).

PENSTEMON LEMMONII Gray, n. sp. Downieville Buttes. Bot. Calif. 1:557 (1876), where Plumas Co. only is cited for Lemmon.

NEMACLADUS LONGIFLORUS Gray, n. sp. Crafton Retreat. Proc. Amer. Acad. 12:60 (1876). Two collectors cited, an earlier by Wallace, but Lemmon's collection was considered the material confirming the taxon as a new species.

ANTENNARIA MICROCEPHALA Gray, n. sp. Sierra Valley. Proc. Amer. Acad. 10:74 (1874). One of the two collections cited.

HULSEA NANA var. LARSENII Gray. Lassen & Scott Mts. Bot. Calif. 1:387 (1876). Not cited; at least a topotype since Lassen Peak is the type locality.

RAILLARDELLA ARGENTEA Gray, n. sp. Lassen Peak. Bot. Calif. 1:417 (1876). One of several collections cited.

BLUE GRAMA AT GOLETA, CALIFORNIA. *Bouteloua gracilis* (H.B.K.) Lag. ex Steud. is established, although not known to have been planted, in at least two partially landscaped parking lot dividers east of the Biological Sciences Building on the Goleta Campus of the University of California (*Ernst 744*, DS, CAS, SBM). Within the dividers, the plants have formed mats of about one square yard in area; some of the progeny are escaping into the joints between the dividers and the black top paving. The area is not watered. Blue Grama has not been reported for Santa Barbara County, California. It is, however, a widespread and valued forage species from the Southwestern to the Central States.—W. R. ERNST, University of California, Berkeley.

LEAFLETS
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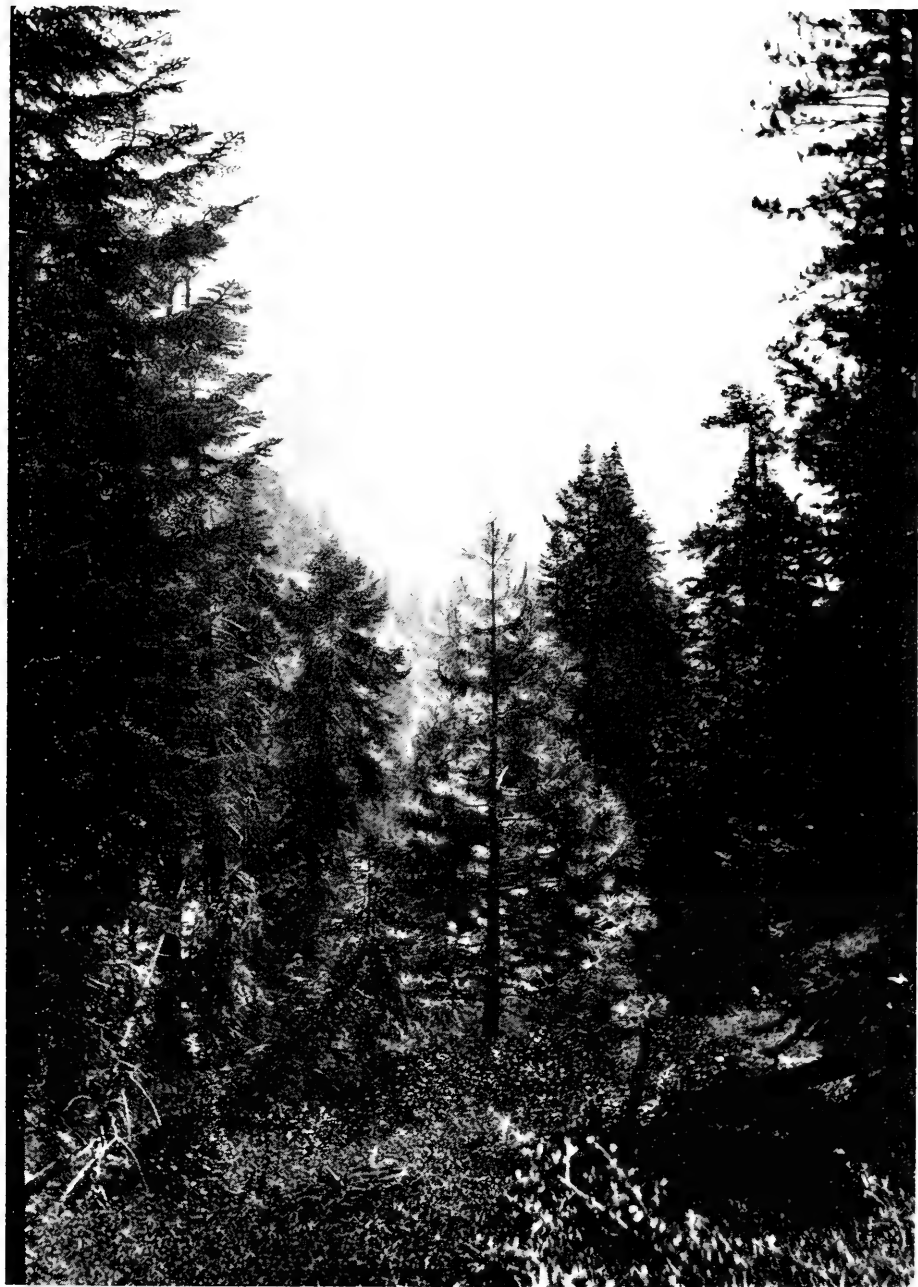
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Tehipite Dome from the vicinity of Gnat Meadow.
Photograph by Lewis C. Allen, September, 1920.

THE TOMPKINS-TEHIPITE EXPEDITION
OF THE CALIFORNIA ACADEMY OF SCIENCES

BY JOHN THOMAS HOWELL

In 1957 Mr. Philip W. Tompkins offered me a botanical field trip that would be at once a memorial to Alice Eastwood and his expression of appreciation to the Botany Department of the California Academy of Sciences "for many courtesies extended . . . in identifying botanical specimens submitted from [his] numerous trips." Mr. Tompkins would perhaps have preferred an expedition to an area in the highlands of the arid Southwest, where he himself has conducted outstanding explorations, but he graciously acceded to my request that I go to Tehipite Valley which in 1905 was the goal of one of Alice Eastwood's adventuresome botanical trips and is still one of the less accessible parts of the Sierra Nevada. My Tehipite trip was in the field for two weeks, from July 19 to August 2, 1958, and it has been designated the Tompkins-Tehipite Expedition of the California Academy of Sciences.

Although Tehipite Valley on the Middle Fork of the Kings River was the objective of the expedition, only about two days were spent there, while seven days were spent at Simpson Meadow, also on the Middle Fork, where a base camp was established and more than three-fifths of the collections were made. Relatively few collections were obtained from the sub-alpine slopes and meadows of the Monarch Divide on either side of Granite Pass, the highest elevation (10,677 feet) attained on the trip. All collections from Tehipite Valley and Simpson Meadow were made in the Transition Zone at elevations between 4000 and 6000 feet.

Although the flora of this part of the Middle Fork canyon (and of the South Fork canyon at comparable elevations) is mostly typical of the flora of the west slope of the Sierra Nevada in the main forest belt (*i.e.*, the Yellow Pine Forest), nevertheless there is a notable incursion of floristic elements generally associated with the flora of ranges in or bordering on the Great Basin and the deserts to the south. *Pinus monophylla* Torr. & Frém., the one-needle pinyon, sometimes becomes the dominant and characteristic tree on hot dry benches of rocky canyon walls,

and in such places it is almost always accompanied by *Cercocarpus intricatus* Wats., a Basin species of mountain mahogany. Other shrubs frequently associated are Spanish bayonet (*Yucca Whipplei* Torr.), pallid silk-tassel [*Garry flavescens* var. *pallida* (Eastw.) Bacigalupi], and sagebrush (*Artemisia tridentata* Nutt.). In association with these woody plants, certain annual and perennial herbs with mostly eastern or southern affinities are to be found in the gorges of the Kings River: *Pellaea mucronata* var. *californica* (Lemmon) M. & J., *Stipa speciosa* Trin. & Rupr., *Carex filifolia* Nutt., *Eriogonum saxatile* Wats., *Petrophytum caespitosum* subsp. *acuminatum* (Rydb.) Munz, *Phacelia cryptantha* Greene, and perhaps others. It is this floristic facet derived from Basin and desert that adds a distinctive note to the Transition Zone flora of these great Sierran canyons.

In all about 600 numbers of vascular plants were collected on the expedition: 100 in Tehipite Valley; 320 in Simpson Meadow and vicinity; the remainder at various stations along the route between Cedar Grove in Kings River Canyon and Tehipite Valley. Although most of these collections will be chiefly valuable in the formulation of a flora of the Sierra Nevada, a few are presently noteworthy and are discussed herewith.

AN ELUSIVE SUNFLOWER

It was in my early high school days that I first fell under the spell of John Muir and his works, and, in my youthful enthusiasm, I developed a strong urge to explore all the "Yosemites" of his "Range of Light." Because of its reputed beauty and grandeur, Tehipite Valley was high on the list. Many years later, my interest in this "Yosemite" of the Kings again came to the fore when it seemed to be the one sure place where I might find the Sierran endemic, *Raillardella Muiri* Gray, a rare relative of the senecioid sunflowers. Here was a plant as elusive as some of the other Sierran rarities which I had sought and not found,—*Abronia alpina*, *Congdonia pinetorum*, *Astragalus lentiformis*, *Arctostaphylos Helleri*—but I was certain I would find the *Raillardella* if only I could get to Tehipite, because Alice Eastwood had reported that in 1905 she had found it "quite abundant on the walls and floor of Tehipite" (*Muhlenbergia* 3:78,—1907). And besides there was still the lure of the awesome canyon and its Dome (which John Muir had classed

with El Capitan and Half Dome as one of the truly great rocks of the Sierra Nevada).

As it turned out, it would not have been necessary to go to Tehipite for the *Raillardella*—I found it in profusion along Copper Creek Trail at the beginning of the long arduous trip to Tehipite as we climbed out of Kings River Canyon towards Monarch Divide. At this station the plant grew in shallow gravelly soil over-lying slabs of granite and was associated with such plants as *Arabis arcuata*, *Potentilla glandulosa*, *Zauschneria latifolia*, *Brickellia californica*, *Gnaphalium microcephalum*, and others. The plants grew on an open exposed slope but in the Transition Zone forest nearby grew *Pinus ponderosa*, *Abies concolor*, *Calocedrus decurrens*, *Quercus Kelloggii*, and *Q. chrysolepis*.

On the return trip from Simpson Meadow two weeks later a second station for the *Raillardella* was discovered farther up Copper Creek Canyon below Lower Tent Meadow at an elevation of about 7000 feet. Here the plant grew in crevices of a large granitic boss or outcrop in the partial shade of Transition forest trees together with *Garrya flavescens* var. *pallida* and *Arctostaphylos Mariposa*.

Just as Miss Eastwood had reported, *Raillardella Muiri* is common on the open rock-strewn floor of Tehipite Valley. Here the plant does not grow on or over granitic surfaces as it does along the Copper Creek Trail, but rather in sandy or gravelly soil around and between rocks and boulders. In this hot and dry habitat in Tehipite the associated plants included *Yucca Whipplei*, *Eriogonum saxatile*, *Mentzelia laevicaulis*, *Zauschneria latifolia*, *Galium pubens*, *Brickellia californica*, and *Senecio Douglasii*.

East of Tehipite along the Middle Fork trail below the falls of Blue Canyon Creek, I again found the *Raillardella*. Here it grew in a dry rocky situation similar to that in Tehipite Valley. I watched for the plant in and about Simpson Meadow but did not find it. However, the four collections I did make on the Tompkins-Tehipite Expedition surpassed my most extravagant expectations and crowned the expedition with success.

Because *Raillardella Muiri* is so rare, I list here all the collections known to me.

FRESNO COUNTY. Tehipite Valley, *Geis in 1913* (UC), *Howell 33960* (CAS; duplicates widely distributed); below falls of Blue Canyon Creek, Middle

Fork of Kings River, el. 4700 ft., *Howell 34044* (CAS); slopes of Mt. Woodworth near Simpson Meadow, *Perkins in 1913* (UC); Copper Creek Trail at 6650 ft. el., *Howell 33679* (CAS), *Peñalosa 2154* (CAS); Copper Creek Trail at 7000 ft. el., *Howell 34208* (CAS).

TULARE COUNTY. On ledge overlooking Middle Kaweah River near Giant Forest, Aug. 2, 1900, *Dudley 3033* (DS); Baker Point, Baker Ridge, on divide between Bull Run Creek and Kern River, about 4 miles north of Kern County line, el. about 7600 ft., Aug. 26, 1943, *Charlotte N. Smith 823* (JEPS).

The type was collected by John Muir at an unknown station in the Sierra Nevada. There is a fragment from the type in Herb. CAS.

A fungus on old stems and leaves in *Howell 34044* has been determined as *Pleospora Balsamorhizae* Tracy & Earle by Dr. Lee Bonar.

A MISUNDERSTOOD MUSTARD

Within minutes after arriving in Tehipite Valley and selecting a camp site, I was out on the open dry rocky floor of the valley beneath the towering Dome in search of *Raillardella Muiri*. Immediately an abundance of the rare composite was found (so one of the prime purposes in visiting the valley was satisfied); and at the same time in dry sandy pockets nearby I discovered small fruiting plants of an annual mustard. Since a late-season flower with purplish petals indicated a *Streptanthus*, and, since vaguely I recalled that a plant from Tehipite had once figured in the nomenclature of the genus, the *Streptanthus* became momentarily the most important botanical thing in my life. On return to the Academy and a botanical library, I found that the Tehipite plant was a topotype of *Pleiocardia fenestrata* Greene and that my collection might be termed an extra Tehipite "dividend" as important as the *Raillardella* itself.

Two years later in June, 1960, I again came across the plant, this time on dry slopes of granitic sand bordering the Copper Creek Trail in the Kings River Canyon. Here the plants were in beautiful bloom, and, from a subsequent study of these and the Tehipite plants, I have concluded that *Pleiocardia fenestrata* is an entity deserving specific recognition. Hence the following systematic notes are in order:

Streptanthus fenestratus (Greene) J. T. Howell, comb. nov. *Pleiocardia fenestrata* Greene, Leaf. Bot. Obs. 1:86 (1904). *S. diversifolius* in small part; Jepson, Fl. Calif. 2:31 (1936); Munz & Keck, Calif. Fl. 221 (1959). *S. gracilis* in part; Abrams, Ill. Fl. Pac. States 2:248 (1944).

Annual, glabrous, glaucous, the stems slender, erect, generally simple, sometimes widely few-branched below the middle, (0.5) 1–2 (3.5) dm. tall; the earliest (*i.e.*, truly basal) leaves not known, the lower cauline leaves to 4 cm. long, with slender petiole and deeply divided blade, the segments

oblong or linear and entire or frequently again lobed or divided, the upper cauline leaves with broadened rachis, shorter and broader entire lobes, and more or less broadened auriculate-lobed base, the uppermost leaves and inflorescence-bracts ovate or ovate-oblong, entire, auriculate-clasping; calyx purple; petals conspicuous, rosy-purplish with a broad limb and slender claw; stamens in 3 pairs; fruiting pedicels divaricately ascending but the siliques erect, ascending, divaricate, or reflexed, 1.5–5 cm. long, 1.5–1.75 mm. broad, flattened; seeds either unwinged or very narrowly winged, 1.5–1.75 mm. long, dark brownish-black.

Collections, all from Fresno County: Tehipite Valley, July 6–10, 1900, *Hall & Chandler 492* (CAS No. 1152, isotype); open places in sandy soil among rocks, Tehipite Valley, 4200 ft. el., July 26, 1958, *Howell 33961*; open places in granitic sand, Copper Creek Trail at about 5500 ft. el., Kings River Canyon, June 6, 1960, *Howell 35335*.

The following key distinguishes *S. fenestratus* from its close relatives, *S. diversifolius* Watson and *S. gracilis* Eastwood:

1. Flowers generally yellow, rarely purplish-tinged; lower and middle cauline leaves entire and linear or pinnately divided with linear lobes. Silique 1–1.25 mm. broad; seed brown, 1.5 mm. long; plants of the Upper Sonoran and Transition zones.....*S. diversifolius*
1. Flowers violet or purplish; leaves and leaf-segments usually oblongish or broader, not linear-filiform.....2
2. Lower cauline leaves deeply divided, the segments often again lobed or divided; silique 1.5–1.7 mm. broad; seeds blackish-brown, 1.5–2 mm. long; plants of the Transition Zone.....*S. fenestratus*
2. Lower cauline leaves subentire to shallowly lobed, the lobes always entire; silique 1 mm. broad; seeds brown, about 1 mm. long; plants of Canadian and Hudsonian zones.....*S. gracilis*

A NEW SEDGE

On the return trip from Tehipite Valley to Simpson Meadow, our progress was delayed along the wild and rocky trail because one of the pack animals broke away from the train. This bit of "bad luck" for the packer was a "lucky break" for the botanist for, while the pack train was being reorganized, I had opportunity to collect specimens of a *Carex* I had never seen before. Five days later on the zigzags of the Copper Creek Trail in the Kings River Canyon I again detected this same *Carex*. Since both of these collections were too mature for satisfactory study, I returned to the Copper Creek station with Lewis S. Rose in June, 1960, when an adequate collection of the plant was obtained. Subsequent studies indicate an undescribed species seemingly referable to the small Section *Firmiculmes*.

Carex Tompkinsi J. T. Howell, spec. nov. Plantae foliosae subdense caespitosae, culmis multis erectis, acute triangularibus, valde scabris supra,

1-4 dm. altis, foliis et culmis aequilongis vel culmis brevioribus; culmis aphyllopodis, foliis laminiferis 1-3 fere prope basem, laminis glabris, planis vel canaliculatis, usque ad 4 dm. longis et 3 mm. latis; spiculis androgynis elongatis vel brevibus, solitariis terminalibusque vel saepe 1 vel 2 spiculis lateralibus sessilibus vel breviter pedicellatis; floribus femineis 1-5, stigmatibus 3, squamis setiferis usque ad laminiferis, squamis masculinis acutis vel obtusis, basi amplexantibus haud connatis; perigyniis elliptico-obovoides, 5-6 mm. longis, 2-costatis enervatis glabris, breviter stipitatis late acutis, brevirostratis, rostro $\frac{1}{5}$ - $\frac{1}{4}$ mm. longo, albo-hyalino subtruncato minute ciliato; rhachilla elongato-lineari scabrida; acheniis subapiculatis, latis planis vel concavis.

Plants leafy, subdensely caespitose with very short caudex-like rhizome, culms many, erect, rather slender and lax, sharply 3-angled, strongly scabrous above the lower leaves, 1-4 dm. tall, about as long as the longest leaves or somewhat shorter, the basal and subbasal leaves of the previous season scale-like or sheath-like, bladeless or the sheaths with reduced blades, leaves of the season blade-bearing, generally 2 or 3, either clustered on the lower part of the culm, or if the culm is elongate, then the uppermost leaf near the middle of the culm or above, the sheaths cylindric, hyaline, brown-tinged at the mouth, the blades light green, smooth and glabrous except on the scabrous margins, flat or canaliculate, to 4 dm. long, 1.5-3 mm. wide, the uppermost leaf sometimes reduced and bract-like; spikelets bractless, androgynous, solitary and terminal or often 1 or 2 lateral in the axils of leaf-like bracts, the lateral sessile or shortly pedicellate, spikelets elongate with the pistillate flowers more or less distant or (especially the lateral) shorter with the pistillate flowers approximate, pistillate flowers 3-stigmatic, 1-5, their scales green with hyaline margins, broadly concave and clasping at the base, awn-tipped or almost leaf-like, in the terminal spikelet the lowest scale attenuate into an elongate filiform tip that may equal or exceed the spikelet, the staminate part of the spikelet generally 0.5-1.5 cm. long, the staminate scales acute to rounded-obtuse, broadly hyaline-margined, clasping but not connate; perigynia elliptic-obovoid, 5-6 mm. long, 2.5-3 mm. wide, 2-ribbed and nerveless, light green or pale buff-green, coriaceous, smooth and glabrous, distended by and closely enveloping the achene, stoutly short-stipitate at base, broadly acutish below the short beak, the beak $\frac{1}{5}$ to $\frac{1}{4}$ mm. long, whitish-hyaline, subtruncate, minutely ciliate; rachilla elongate-linear, scabridous; achene broadly elliptic, triangular with flat or concave sides, 4-5 mm. long, cuneate at base, subapiculate at apex, minutely granular.

Open or partially shaded places on dry rocky slopes in the canyons of the Middle and the South forks of the Kings River, 3200-5500 ft., Fresno County, California.

Type: Herb. Calif. Acad. Sci. No. 428,953, collected in partial shade around granitic rocks, Copper Creek Trail, Kings River Canyon, 5500 ft. el., June 6, 1960, by J. T. Howell, No. 35333.

Other collections, all from Fresno County. Rocky slope along trail between Tehipite Valley and Simpson Meadow, Middle Fork of the Kings River, about 5500 ft. el., July 28, 1958, *Howell 34068*; in partial shade around granitic rocks, Copper Creek Trail, Kings River Canyon, 5500 ft. el., Aug. 2,

1958, *Howell* 34219; around metamorphic rocks, $\frac{1}{2}$ mile east of Boyden Cave, Kings River Canyon, 3200 ft. el., June 6, 1960, *Howell* 35372; on metamorphic rocks, 3 miles west of Horseshoe Bend on the Kings Canyon Highway, 3300 ft. el., June 6, 1960, *Howell* 35386.

In spite of the fact that the plant described here sometimes develops culms with two or three spikelets, everything about its flowers and fruits indicates a close relationship to Section *Firmiculmes* as that section is treated by Mackenzie. The following key distinguishes *C. Tompkinsi* from the two monostachyous species in *Firmiculmes*:

1. Culms terete or obtusely triangular, usually smooth.....*C. multicaulis*
1. Culms sharply triangular, scabrous above.....2
2. Rootstocks prolonged; spikelet solitary; pistillate scales short-awn-tipped or awnless, not foliaceous.....*C. Geyeri*
2. Rootstocks not prolonged, the plants caespitose; spikelet solitary or sometimes 2 or 3; pistillate scales more or less foliaceous.....*C. Tompkinsi*

WASHINGTONIA SPONTANEOUS IN KERN COUNTY, CALIFORNIA

BY ERNEST C. TWISSELMANN

Cholame, California

The California fan palm, *Washingtonia filifera* (Lindl.) Wendl. is not only one of the best known native trees of the state, but it has been widely planted in temperate zones throughout the world. However, I can find no record of its naturalized occurrence in the western United States, and so the small colony at the mouth of Kern Canyon, in Kern County, California, is of special interest. Four young trees, from eight to fifteen feet tall, grow on the steep north wall of the canyon, where a seep from an old flume trickles down the canyon side. Two large trees, about thirty feet tall, grow at the river's edge at the bottom of the canyon, and another large tree grows between huge granitic boulders upstream 0.75 mile (my collection No. 5962). There is at least one more large tree growing on the boulder-strewn streamside, this one 2.1 miles east of the canyon mouth. The most likely source of the trees is from seeds from the planting of palms at the power house just west of the canyon mouth. The upstream dispersal, however, is interesting—I have found no palms downstream from the power house, where

the river leaves the steep narrow canyon and leads out to the broad Bakersfield plain in the upper San Joaquin Valley.

Other adventives that reflect the subtropical environment of lower Kern Canyon include castor bean (*Ricinus communis* L.), a fairly common stream bank plant along sand bars and other places with good moist soil, and occasional common pepper trees (*Schinus Molle* L.). The native flora characteristic of the canyonsides consists of a sparse cover of subshrubs such as *Eriogonum fasciculatum* Benth. var. *polifolium* (Benth.) T. & G., *Encelia virginensis* A. Nels. ssp. *actoni* (Elmer) Keck, *Hymenoclea Salsola* T. & G., and *Atriplex polycarpa* (Torr.) Wats., a group indicative of the sudden transition from Upper Sonoran to Lower Sonoran plant associations that takes place at the mouth of the canyon.

The hot dry canyon, with its mild winter climate, and the moist rocky-sandy soil along the Kern River, approximates the sort of place where the trees grow as a relict species in the region around the Colorado Desert in southern California, extreme western Arizona, and northern Baja California. When one considers the despoilation of the native flora of California that has taken place in recent years, that has seen common species become rare, and rare ones approach the point of extinction, it is good to be able to report that one of California's rare trees, and one of equal interest to the botanist and the layman, has succeeded in establishing itself in even such a limited way in a place similar to its natural habitat. Although perhaps unrealistic, one can hope that from such a small beginning an extensive naturalized colony may one day develop.

THE MANZANITAS OF CALIFORNIA'S POINT SUR REGION

BY JAMES B. ROOF
Berkeley, California

I. ON THE OCCURRENCE OF *ARCTOSTAPHYLOS EDMUNDSII*

In the late afternoon of June 1, 1961, I tried to see *Arctostaphylos Edmundsii* J. T. Howell at its type locality on the Monterey County coast. Not then knowing the exact location of the type plants, I stopped somewhat north of them. At that random

halt the terrain below State Highway No. 1 looked unpromising. Above the highway, however, I could see a large patch of *A. Edmondsii*. After a difficult scramble up loose sandstone and over a wire fence I reached the patch. It led to another, and another, until I was in the heart of a great colony of plants of this species. I remained there for an hour, until a soaking drizzle and darkness ended that day's observations.

Five days later I went back with an assistant and together we found the type locality of *A. Edmondsii*. I then learned that on the previous occasion I had been one-fifth of a mile north of it and had inadvertently come upon an outstanding botanical and horticultural treasure trove. When Edmunds found the Little Sur manzanita in the summer of 1949, he did not know how close he was to this huge storehouse of native plant wealth. Nor did he know about it until I told him on June 10, 1961. However, in his original statement on the discovery of the Little Sur manzanita¹ he wrote: "I have never seen this plant elsewhere on the Monterey Coast but, of course, I have gone over only a small fraction of the area, and the plants may occur elsewhere." They do, indeed.

Of the type locality Edmunds also wrote: "There were possibly a dozen plants in the colony. . . ." Since no extensions of range have been reported since then, the investigations carried on by The Regional Parks Botanic Garden make it necessary to amend the original report to include three places of natural occurrence of *A. Edmondsii* as follows:

1. The type locality: a dozen or so plants along the lower side of State Highway No. 1, exactly 1.2 miles south of the south abutment of the highway bridge spanning the Little Sur River. This location is 0.9 of a mile north of the entrance road to the Point Sur Light Station and is on Hurricane Point, the first but not too pronounced headland north of Point Sur, Monterey County.

2. A few depauperate shrubs a hundred or so yards below the highway and close to the brink of the sea bluff, 1.1 miles south of the south abutment of the highway bridge that spans the Little Sur River. This location lies between the not too pronounced "prongs" of Hurricane Point, which is really little

¹ In "The Little Sur manzanita, a new species" by John Thomas Howell, *Leaf. West. Bot.* 6:202-204 (1952). All quotations and references included hereinafter are from that article.

more than the first pronounced sea bluff to the south of the Little Sur River.

3. A wide belt of plants above the highway, starting at a point exactly one mile to the south of the south abutment of the highway bridge that spans the Little Sur River and extending upward and eastward from that point. The belt of plants is on a steep sandstone slope that, nearest to the highway, faces north, then describes a wide arc until the inland end of the colony, following the curving canyon, is facing to the east.

This third is by far the largest group of *A. Edmondsii* known in the natural state. It is about five hundred yards long and two hundred feet deep. The lower edge of this manzanita belt lies at an elevation of approximately 250 feet; its upper edge is eventually lost in grassland and brush consisting of *Ceanothus griseus* var. *horizontalis* at about 450 feet elevation.

The native shrubs associated with *A. Edmondsii* at the type locality were originally listed as *Adenostoma fasciculatum*, *Rhamnus californica*, *Ceanothus griseus* var. *horizontalis*, and *Salvia mellifera*. In this new colony the more conspicuous associated shrubs are *Vaccinium ovatum* and *Gaultheria Shallon*.

2. A NEW VARIETY IN ARCTOSTAPHYLOS EDMUNDSII

Although this colony contains many hundreds of plants of *Arctostaphylos Edmondsii* all the shrubs in it do not consistently match those of the type locality. While they are all unquestionably of the species under discussion, the number of forms and oddities embraced within this extensive colony will delight and baffle horticulturists and directors of botanic gardens for some time to come.

The heart of the colony contains many small eroded ridges, humps, and some nearly perpendicular banks of sandstone. Narrow trails, well accented by the passes of numerous deer, penetrate the site. Visitors here are most unusual. Away from the highway startled deer spring from the coverts within the manzanitas, and without looking back at approaching humans, move off to the grass and soft chaparral at the eastern end of the ravine.

Much of the sandstone in this location, while not a hard rock, is harder than the softer, sandy soil characteristic of the type locality of *A. Edmondsii*, a fifth of a mile away and very near the sea dunes. The hardness and semi-bareness of the rock base in

the large colony, coupled with severe wind action, have caused here a marked difference in the character of *A. Edmundsii*.

In the majority of the plants the most outstanding feature of their leaves, as compared with the leaves of shrubs from the type locality, is their conspicuous dark green color and glossiness. Another feature in the case of many diminutive shrubs is their extremely small leaves, often reduced to sizes as small as one-eighth of the bright green leaves from shrubs of the type locality. Many of the shrubs having such reduced leaves are as prostrate as shrubs can be, creeping over sandstone mounds at heights of from one to two inches, or hanging down almost perpendicular banks in large closely adherent drapes that may have a spread of as much as fifteen feet.

Another feature of the shrubs lies in the fact that, while many of the colony's taller shrubs (up to two feet in height) bear the dull green fruits that Edmunds (on June 10, 1961) told me are characteristically borne by the type plants, these prostrate or nearly prostrate shrubs with tiny leaves bear small shiny, bright red fruits. With their glossy green leaves, these shrubs somewhat resemble depressed cranberry shrubs in full fruit or, even more closely, the dark glossy green leaves of shrubs of the decumbent *Gaultheria ovatifolia*.

Since it will be necessary to refer to these shrubs as forms apart from typical *A. Edmundsii*, I propose the following variant from that species, ***A. Edmundsii* J. T. Howell var. *parvifolia* J. B. Roof.**²

I should add that many of our native plants are shabby in their natural habitats and attain handsomeness only after they are brought into cultivation and tended. In the case of the natural "hanging gardens" of *A. Edmundsii* var. *parvifolia*, I shall dismiss caution and declare that they contain the most fabulous and beautiful of any of California's dwarf manzanitas that I have ever seen. The small struggle involved in reaching this enchanting colony is negligible in view of the reward attendant on a stroll through its quiet reaches.

² ***Arctostaphylos Edmundsii* J. T. Howell var. *parvifolia* J. B. Roof, var. nov.** Prostrata, 4-8 cm. alta; foliis parvis, plerumque 7 mm. longis et 5 mm. latis, usque ad 14 mm. longis et 8 mm. latis, atrovirentibus, pernitentibus; fructibus parvis, 6 mm. latis, rutilis nitentibus.

The type, Herb. Calif. Acad. Sci. No. 425,195, collected by J. B. Roof and D. L. Harmon, one mile south of the southern abutment of the bridge over the Little Sur River at 275 feet elevation, Monterey County, California, June 6, 1961. The type plant is in the center of the second patch of *A. Edmundsii* above Coast Highway No. 1 at the indicated point, but the variety is also abundant higher in the colony.

3. OTHER VARIANTS IN *ARCTOSTAPHYLOS EDMUNDsii*

Within the large colony of *A. Edmundsii* and its variety *parvifolia*, in a sheltered side ravine, is a single shrub of *A. Edmundsii* having leaves characteristic of those of the type shrubs, but with a height of five feet, and with a basal trunk diameter of a little over four inches. A foliar specimen from this upright shrub has been deposited in Herb. Calif. Acad. Sci., No. 425,200A.

At the far upper end of the colony is a shrubby manzanita a little over four feet in height, one that answers to the botanical description of *A. Edmundsii*, but which has rough leaves, juvenile and otherwise, without the color and distinguishing red margins and midribs mentioned by Edmunds in April, 1952: "The bright green leaves, especially on the younger foliage, are tinged red on margins and midrib." This rough-leaved shrub seems to be alone in the great colony of *A. Edmundsii* and its variety *parvifolia*. A leaf specimen from this upright plant has been placed in Herb. Calif. Acad. Sci., No. 425,200B.

4. *ARCTOSTAPHYLOS UVA-URSI* AT POINT SUR

The sea slope containing the type plants of *A. Edmundsii* on Hurricane Point faces directly at Point Sur. Nine-tenths of a mile by highway to the south of the type locality is the junction of State Highway No. 1 and the entrance road to the Point Sur Light Station.

Unlike Hurricane Point, Sur is extremely prominent, ranking with Point Reyes, Point Arena, and Cape Mendocino as one of California's great coastal juts. Like the extreme tip of Point Reyes, it is essentially a sea-mount that stands forth unmistakably from the central Monterey County coast some twenty-seven miles south of the city of Monterey. The picturesque light station there is operated by the United States Coast Guard, and anyone may open their unlocked gate and enter the reservation's road between the hours of 12 noon and 3 p.m. daily. The road crosses a stretch of dunes to the inner base of the great mound (which is almost surrounded by rough Pacific surf), then bears to the left and ascends the mound.

From State Highway No. 1 it is a distance of 1.2 miles to the lighthouse. The narrow one-way road winds around the south side of the sea-mount, climbing steeply as it goes, making a full circle around the mount to reach the summit.

As the road ascends the extreme western sea face of Point Sur

it cuts diagonally upward through a half-acre of *Arctostaphylos Uva-ursi*. Though in large loose "carpets," the shrubs are not readily visible; they are associated with depauperate *Salvia mellifera* and *Eriogonum parvifolium*, all reduced to low almost anonymous conformity by the powerful winds that sweep this steep and unsheltered extremity.

After a visitor parks and leaves his car atop the mount, one shrub of *A. Uva-ursi* is easily reached along the footpath that leads to the lighthouse from the road's northernmost point. The shrub is on the lower side of the path beneath the hand-rail, 76 paces down the path from the road. It spreads eight by fifteen feet and is easily seen by anyone who knows it is there.

It seems incredible that this station for *A. Uva-ursi* has been overlooked to date, but I know of no record to support its occurrence in Monterey County. Our most recent California flora (that of Munz and Keck in 1959) listed the location on San Bruno Mountain, northern San Mateo County, as the southernmost limit of the species in California. I therefore submit the following as a range extension, based on a specimen collected June 6, 1961, by Roof and Harmon, on the western face of Point Sur, Monterey County, California, at an elevation of approximately 125 feet above sea level, Herb. Calif. Acad. Sci. No. 425,196. The extension of range is ninety airline miles south of the San Bruno Mountain location for the species.

This Point Sur form of kinnikinnick fruits quite freely, the berries being fully ripe on June 6, the date of our collection. We took several ounces of the berries for germination studies. Just prior to ripening they are a pale greenish-white in color, suffused on one side with pinkish-red. At full maturity they are a golden-yellow in color, rather surprising in fruits of this species. They become tan colored as they dry out and fall from the trailing branches of the shrubs. When fully formed the berries are nearly round, 9 mm. broad and 7 mm. thick.

The leathery leaves of the shrubs, a little drier looking and a duller green than are most of those from *A. Uva-ursi* locations to the northward, are generally oblong in shape, averaging 2 cm. long and 1 cm. broad. Some of the leaves have truncate bases in the manner of certain leaf-bases in *A. Edmundsii*, but that fact does not in any way detract from the validity of this plant as *A. Uva-ursi*.

No flowers were found on any of the shrubs at Point Sur in

June, 1961. Farther north the species is known to bloom from about February 15 to March 31 of each year. Judging from the ripeness of the fruits on the Point Sur shrubs, I believe the flowering time there must have followed a similar pattern.

It was Dr. Rimo Bacigalupi who guided me to this important discovery. On February 28, 1961, he told me that, many years before, he thought he had seen wind-blown *Arctostaphylos Hookeri* "out on the point near the Sur Lighthouse in Monterey County," but that he was not positive it was *A. Hookeri*. We know much more in 1961 about the low-growing manzanitas than we did thirty or more years ago, and discovering that it was *A. Uva-ursi* on the point does not in any way detract from his suggestion to look there for a spreading manzanita. The remarkable memory of the distinguished Curator of the Jepson Herbarium of the University of California has served to give me many excellent leads in my search for native plant locations, and the Regional Parks Botanic Garden has gained much from his frequent reminiscent suggestions. Though he did not then recognize it as *A. Uva-ursi*, Dr. Bacigalupi was perhaps the first botanist to see the colony of the species at Point Sur.

5. A HYBRID MANZANITA AT POINT SUR

Reference is made above to a Point Sur shrub of *A. Uva-ursi* "along the footpath that leads to the lighthouse . . . on the lower side of the path beneath the hand-rail, 76 paces down the path from the road." On June 6, 1961, Lynn Harmon swung down beneath that bright yellow hand-rail and went twenty feet down the steep slope to discover there a trailing shrub of undoubted *A. Uva-ursi* parentage that had not dull but glossy green leaves. These coriaceous leaves are from 8 to 23 mm. long and from 5 to 7 mm. broad, though most of them average 15 mm. in length and 8 mm. in width. They are distinguished by their varied shapes: they may be oblong or rounded; the tips may be acute, mucronate or emarginate, and their bases are rounded, truncate or cordate. These leaves are densely imbricate along trailing branchlets that are a pale green in color when fresh and covered with the pilose pubescence that is characteristic of the terminal branchlets of *A. Uva-ursi*.

Among the leaves on this trailing shrub, we found more than

one with the characteristic red midrib of the leaf of *A. Edmundsii*, and indeed, many of the leaves, though thicker, have the shapes of leaves of typical *A. Edmundsii*. However most of the leaves seem straightly derived from *A. Edmundsii* var. *parvifolia*.

It should not be assumed that this putative cross is a part of the proof that *A. Edmundsii* is a natural hybrid between *A. Uva-ursi* and another manzanita (perhaps *A. pajaroensis* Adams of northern Monterey County). In this case it would seem that some pollen was carried over the intervening 1.5 miles from Hurricane Point to the *A. Uva-ursi* on Point Sur, and not the reverse. Extreme glossiness or slick shininess of the leaves is practically unknown in *A. Uva-ursi*. Except for scarlet fruits on some specimens of *A. Edmundsii* var. *parvifolia*, there are few palpable traces (such as truly dull leaves) of *A. Uva-ursi* in the colonies of *A. Edmundsii* or its variety.

Though Edmunds may gently disagree with me, I do not consider the mature leaves of typical *A. Edmundsii* to be glossy. If the interpretation be strict, typical mature leaves of *A. Edmundsii* are shiny but not glossy. Those of *A. Edmundsii* var. *parvifolia* are indeed glossy, and it is this character which we find in the leaves of the Point Sur plant. While its habit, method of branching, pilose branchlets, and imbricate (often resupinate) leaves are derived from *A. Uva-ursi*, only the shapes of its leaves and their glossiness are derived from *A. Edmundsii* var. *parvifolia*.

The plant on which these observations rest is represented in Herb. Calif. Acad. Sci. by Nos. 425,198 and 425,199, collected by Roof and Harmon on the western face of Point Sur, Monterey County, California, at an elevation of about 105 feet above sea level, June 6, 1961.

6. THE ORIGIN OF ARCTOSTAPHYLOS EDMUNDSII

There remains the question of the origin of *A. Edmundsii*. In the type description of that species Howell noted that *A. Edmundsii* might be a cross between *A. pechoensis* Dudley of San Luis Obispo County and *A. Uva-ursi*. I cannot agree that *A. pechoensis* is one of the parents. However, in conversation on May 23, 1961, Howell mentioned that he believed *A. pajaroensis* Adams to be one of the two most closely related to *A. Edmundsii*. With that opinion I fully agree. On some individu-

als of *A. pajaroensis* the foliage is so like that of *A. Edmundsii* that we must look to other features (such as the peculiarly shaggy bark of the former) for a technical character that will separate the two.

In the type description of *A. Edmundsii*, after establishing several botanical links between *A. Edmundsii* and *A. Uva-ursi*, Howell wrote: "Although *A. Edmundsii* should be too far distant from present-day members of . . . *A. Uva-ursi* to predicate a hybrid origin for so isolated a plant, I believe it not unreasonable to assume that it may have been derived from an ancient cross between . . . two groups. *Arctostaphylos Uva-ursi* is not now known so far south. . . ."

These present notes with their cited specimens have indicated that two of the species required for Howell's linkage are separated from each other by no more than 1.5 miles. His work of nine years ago rested on excellent foundations, and the discovery made by Louis Edmunds south of the Little Sur River remains botanically valid. For these reasons, as much as for any others, it has been especially enjoyable to contribute these few additions to the botany of manzanitas in the Point Sur region.

Regional Parks Botanic Garden
Berkeley, California

MELICA BULBOSA IN LASSEN PARK. The Flora of Lassen Volcanic National Park* was less than one month old when the first addition to the plant catalogue came to our attention: *Melica bulbosa* Geyer, collected on August 18 on the rocky summit of Diamond Peak by Hans Leschke, No. 1828. Already the Flora was in need of revision; but at least the first omission to be noted was detected by one of the authors!—J. T. HOWELL.

* A Flora of Lassen Volcanic National Park, California. By George W. Gillett, John Thomas Howell, and Hans Leschke. *Wasmann Journal of Biology* 19:1-185 (July, 1961).

LEAFLETS *of* WESTERN BOTANY

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JOHN THOMAS HOWELL

THE SOUTH AMERICAN SPECIES OF
HYMENOXYS (COMPOSITAE)

BY KITTIE F. PARKER

Washington, D.C.

INTRODUCTION

Hymenoxys Cass., in the tribe *Helenieae* of the *Compositae*, is exclusively American. It consists of two subgenera, *Hymenoxys* and *Tetraneuris*, or these are regarded as separate genera by some authorities. Although there are only twenty-seven species, these are widely distributed and often dominate extensive areas locally. The center of distribution is in the Rocky Mountains and plains of western North America where there are twenty-three species extending from southwestern Canada, southward through western and southwestern United States, and through Mexico to the State of Vera Cruz.

A secondary center of distribution is in South America where there are four species ranging from southern Peru southward to Bolivia and through Argentina to the Province of Chubut, and from southeastern Brazil to Uruguay (Plate 1). The four South American species are weedy annuals belonging to *Hymenoxys*, whereas the North American species are mostly perennials or biennials and about equally represented in both *Hymenoxys* and *Tetraneuris*.

The generic history, relationships, and taxonomic position of *Actinea*, *Hymenoxys*, and *Tetraneuris* are discussed fully in a forthcoming treatment of the North American species of these taxa and will not be mentioned here.

ECONOMIC CONSIDERATION. It is probable that the South American species contain the same poisonous properties as the North American species. Although no literature on the subject was located, specimen labels indicate that the various species are regarded as poisonous to livestock. Two North American species, *H. odorata* DC. and *H. Richardsonii* (Hook.) Cockerell, are toxic, principally to sheep. Parker (1936), working with *H. Richardsonii*, found that animals will not eat the bitter-tasting plants unless other forage is scarce. The poison is cumulative and Hardy (1931) found that about one pound of young *H. odorata* is a lethal dose for a grown sheep when eaten in a period of two days.

ACKNOWLEDGMENTS. The author is grateful to the members of the staff of the U.S. National Herbarium, and to Dr. Walter S. Phillips and Dr. Leon M. Pultz, Head and former Head, respectively, of the Department of Botany, University of Arizona, for their aid and suggestions. Appreciation is expressed to the curators of the following herbaria for lending or making their material available for study:

British Museum (BM); Chicago Natural History Museum (F); Conservatoire et Jardin botaniques, Geneva (G) and (G-DC); Gray Herbarium (GH); Royal Botanic Gardens, Kew (K); Instituto Miguel Lillo, Tucumán (LIL); Museo de la Plata, División Botánica, La Plata (LP); Botanische Staatssammlung, München (M); Missouri Botanical Garden, St. Louis (MO); New York Botanical Garden (NY); Museum National d'Histoire Naturelle, Paris (P); Philadelphia Academy of Natural Sciences (PH); University of California, Berkeley (UC); United States National Herbarium (US). (Abbreviations of herbarium names are from Lanjouw and Stafleu, 1959.)

Specimens cited in this paper, whether holotypes, isotypes, or other specimens, have been examined. The phototypes refer to photographs of the type or an isotype.

The maps presented are based on Goode Base Maps No. 103, copyright 1937 by the University of Chicago, and are used by permission of the University of Chicago Press.

CYTOLOGICAL STUDIES

An investigation of the chromosome number and morphology of nineteen taxa of North American *Hymenoxys* and *Tetra-neuris* was made by Speese and Baldwin (1952). Seedlings were grown in the greenhouse from seeds furnished by the writer and cytological studies were made from the young leaf cells. Of the sixteen species, representative of both subgenera, examined by them, fifteen have a basic chromosome number of 15. All of these are diploid with $2n = 30$, except one species which is tetraploid and has $2n = 60$. The sixteenth species, *H. odorata*, does not follow the basic cytological pattern of $n = 15$, but has $n = 11$, according to Speese and Baldwin (1952, 1961).

Cytological studies of the South American species, particularly *H. anthemoides*, have long been anticipated, but awaited the arrival of viable seeds. Since it is the type species, and also very closely related to the aberrant *H. odorata*, its phyletic

trend, whether it follows the basic cytological pattern for the genus or that of *H. odorata*, is important. Mature seeds of *H. anthemoides* have now been received from La Paz, Argentina, Dr. Arturo Burkart in 1960 (US), and a cytophyletic analysis has been made by Speese and Baldwin (1961), from greenhouse seedlings, Baldwin 15580 (US). They found that the plant agrees with the basic generic chromosome number of 15, and has $2n = 30$. This number is corroborated by Otto Solbrig (personal communication in 1961), to whom Burkart also sent seeds of the La Paz collection.

It is significant that the chromosome morphology of *H. anthemoides* agrees with the cytological patterns of the North American species, adding more evidence that the South and North American species are congeneric. It is hoped that mature seed or bud material can be obtained from the three other South American species for further chromosome studies.

IMPORTANT MORPHOLOGICAL AND DIAGNOSTIC CHARACTERS

Stems. The stem height and branching habit separate *H. anthemoides* from the three other species. Although all species can be many-branched in old plants with the outer branches ascending to somewhat decumbent, those of *H. anthemoides* are diffuse and divaricate.

Leaves. The width of the principal leaf divisions and the number of divisions are very useful in separating *H. anthemoides*. Except in unusually robust plants, it can be separated from the other species by the very narrow width of the leaf divisions alone. Often its leaves are greatly divided also. Leaf characters are not important in delimiting the other species, however.

Peduncles. The peduncle length is important in separating *H. anthemoides*, since it is definitely shorter, but not particularly important in delimiting the other species.

Heads. The width of the heads is significant. They are distinctly narrower in *H. anthemoides* and distinctly broader in *H. robusta*, but about the same width in *H. Cabrerae* and *H. Tweediei*. There is a correlation also between the head width and the number of disk-flowers present, with the fewest in *H. anthemoides*, the largest number in *H. robusta*, and the numbers for the other two falling in between.

Involucre. An unusual character is found in *H. anthemoides*,

where the disk-flowers are mostly totally included within the involucre in fruit, but considerably surpass it in the other species.

Ray-flowers. The presence of ray-flowers in *H. Tweediei* is significant and not merely a gene difference, as in the rayless form of the North American *H. acaulis* (Pursh) Parker var. *acaulis*. In the latter case, in populations where this condition occurs, the heads vary from no rays, or a few depauperate rays, to rays of the normal size and number. Plants of *H. Tweediei* with rayless heads have not been examined. All heads have the normal ray-flowers.

Pappus-scales. The length of the pappus-scales when correlated with the length of the disk-corollas is one of the most important diagnostic characters and clearly separates *H. Cabrerae*, *H. Tweediei*, and *H. robusta*. In *H. anthemoides* and *H. Cabrerae* the pappus lengths vary considerably (often in the same floret). They are mostly longer than the disk-corollas, but may be to only $\frac{3}{4}$ as long. In *H. Tweediei* they are mostly about $\frac{2}{3}$ as long, but sometimes to about $\frac{1}{2}$ as long. The short, broad pappus of *H. robusta* is only $\frac{1}{3}$ to $\frac{1}{2}$ as long as the disk-corollas. These relationships are shown for all four species in Plate 2.

EXPLANATION OF PLATES

Plate 1. Distribution of *Hymenoxys* in South America. *Hymenoxys Tweediei* (squares); *H. Cabrerae* (solid triangles); *H. robusta* (dots); and *H. anthemoides* (open triangles).

Plate 2. Floral parts. A. *Hymenoxys Tweediei*, from *Tweedie 859* (type): Aa, disk-flower, x 10; Ab, ray-flower, x 4; Ac, head, x 2; Ad, disk-corolla with two pappus-scales showing height relationship, x 10.

B. *Hymenoxys robusta*, from *Bang 925* (isotype): Ba, three pappus-scales and disk-corolla showing shape and height relationship, x 10; Bb, disk-flower, x 10; Bc, conical receptacle showing achene scars and involucre remnants, x 8; Bd, style and style branches, x 10.

C. *Hymenoxys Cabrerae*, from *Cabrera 8588* (type): Ca, disk-flower, x 10; Cb, disk-corolla with two pappus-scales showing height relationship, x 10; Cc, head, x 3; Cd, inner phyllary, x 6.

D. *Hymenoxys anthemoides*, from *Commerson in 1767* (type): Da, disk-flower, x 8; Db, disk-corolla with two scales showing height relationship; Dc, head, x 3; inner phyllary, x 6.

Plate 3. A, *Hymenoxys Cabrerae*, from *Cabrera 8588* (type), x $\frac{1}{2}$; B, *Hymenoxys Tweediei*, x $\frac{1}{2}$.

Plate 4. A, *Hymenoxys anthemoides*, x $\frac{1}{2}$; B, *Hymenoxys robusta*: Ba, basal rosette, x $\frac{1}{2}$, Bb, portion of stem from *Bang 925* (isotype), x $\frac{1}{2}$.

PLATE I

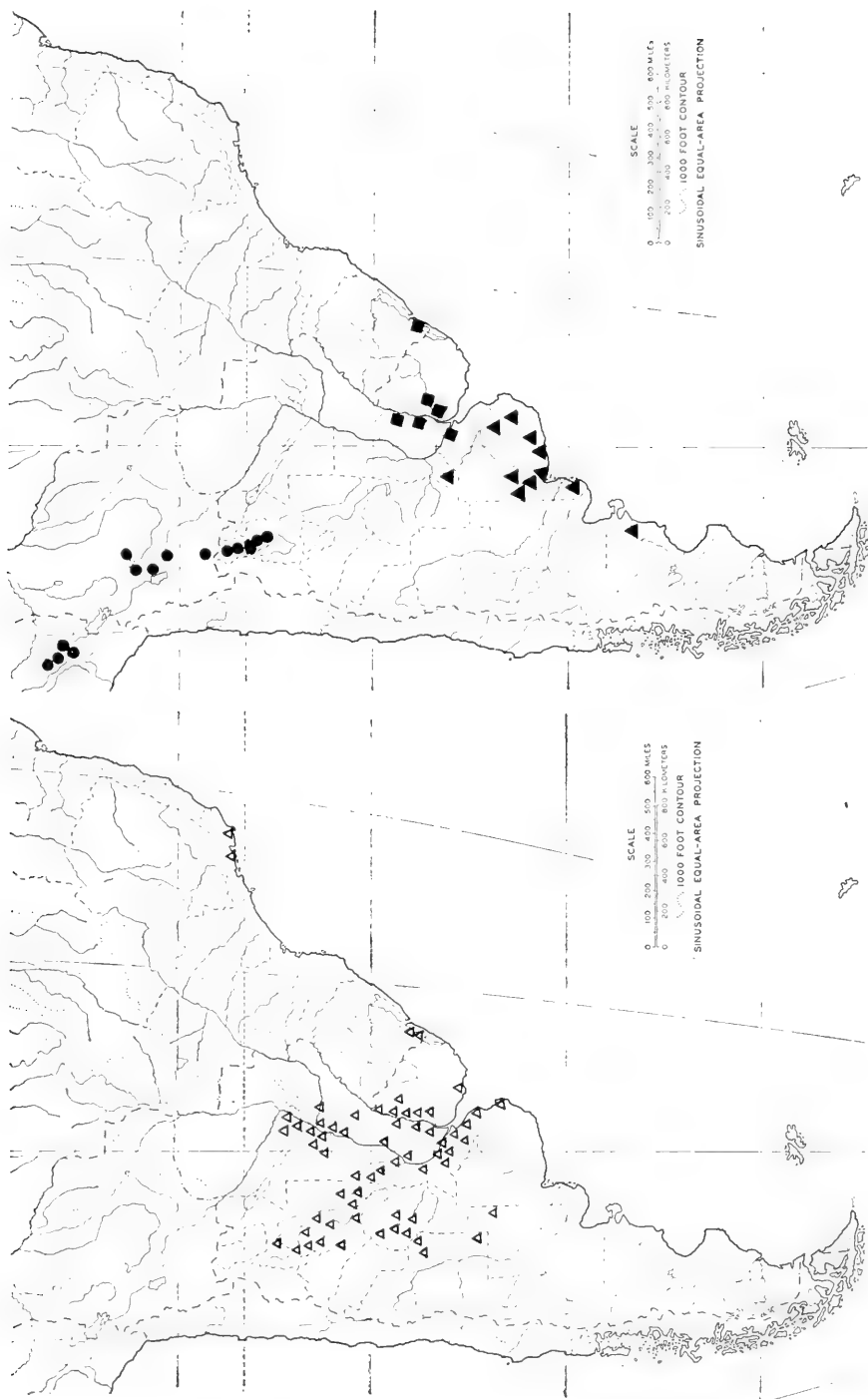


PLATE 2

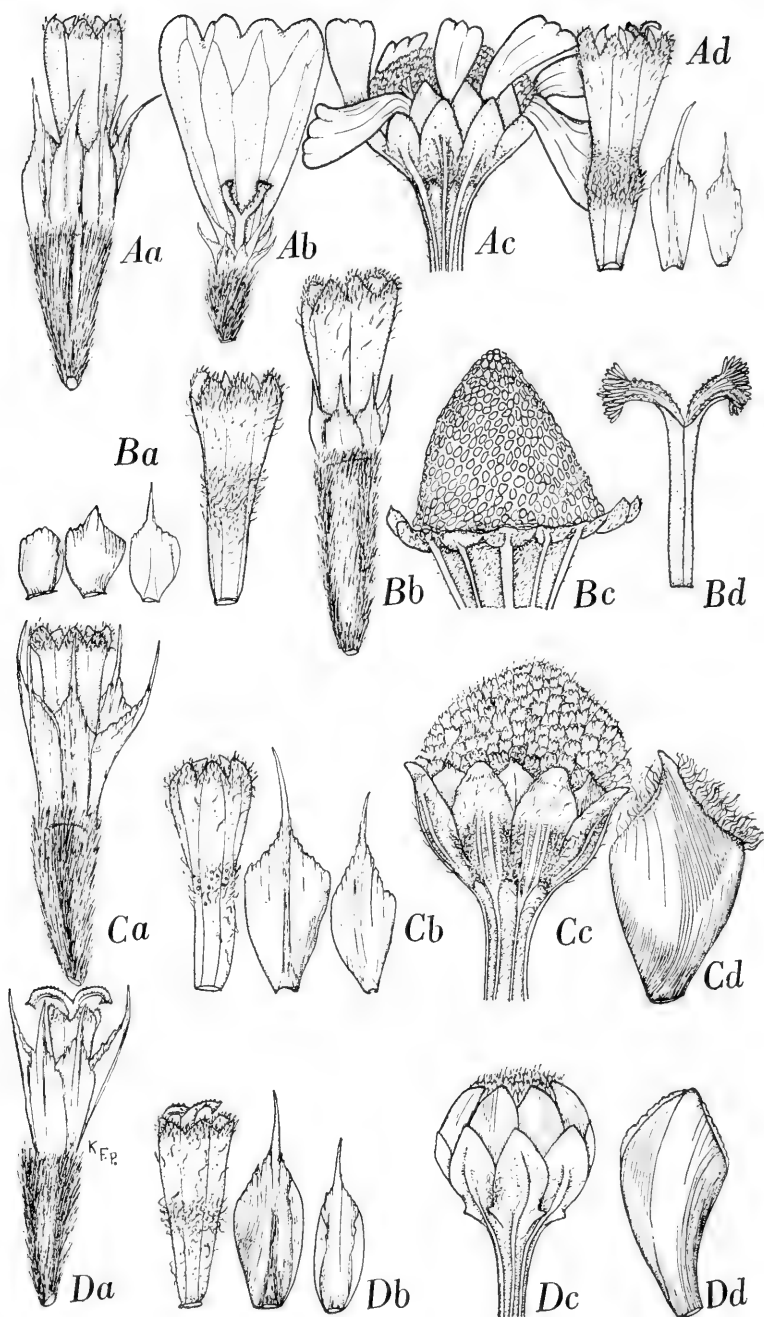
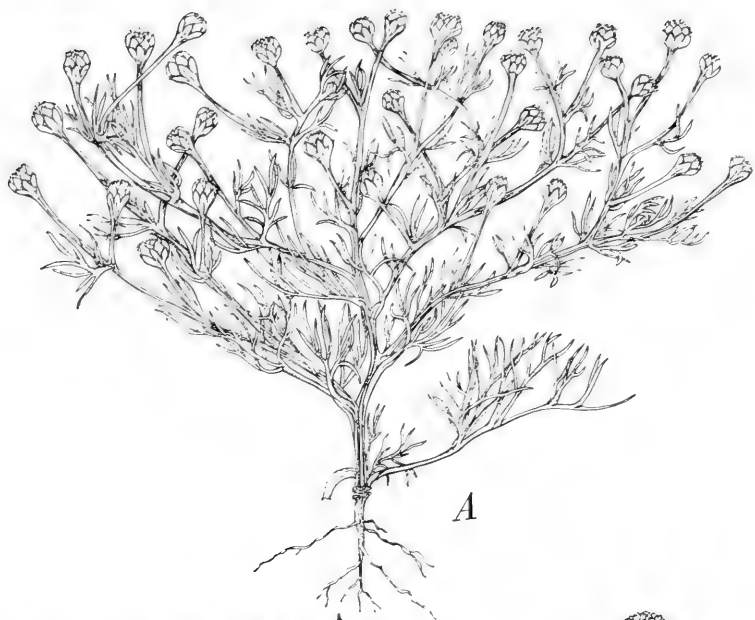


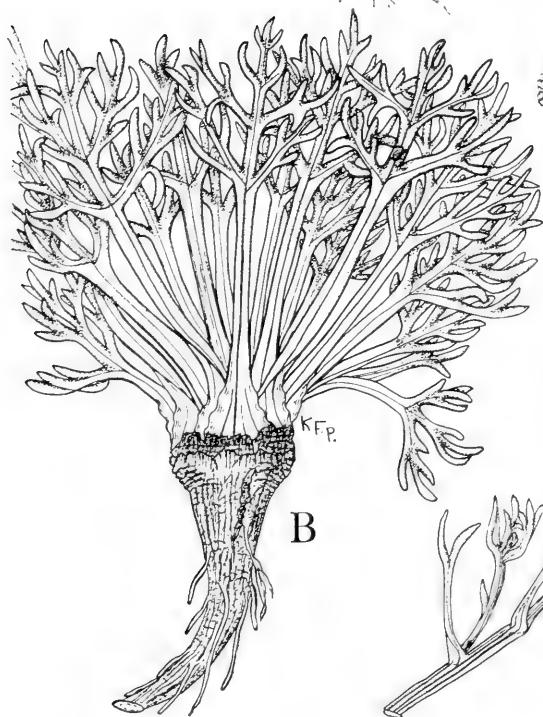
PLATE 3



PLATE I

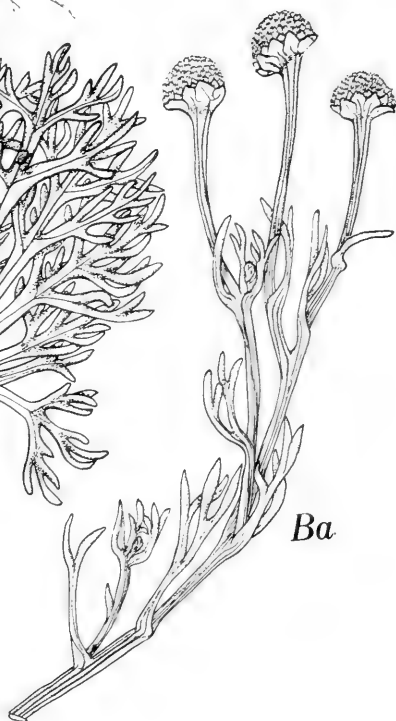


A



B

K.F.P.



Ba

MEASUREMENTS

Measurements were made from dry specimens, except for the flowers which were soaked. In counting the number of leaf divisions, the ultimate segments were counted; for width, the broadest division was measured. Peduncle length was measured from the last leaf (regardless of size) on the stem. Width and height measurements of the heads were made from the broadest and highest points, and in each case include the involucre and the disk-flowers. Pappus-scale lengths include the awns. Achene measurements do not include the hair which may extend beyond the top of the achene.

SYSTEMATIC TREATMENT

HYMENOXYS Cass. Dict. Sci. Nat. 55:278 (1828).

Succulent aromatic herbaceous plants, annual, or one sometimes biennial,* 10–60 cm. high, mostly spreading and bushy at maturity, the herbage bitter to the taste, sparingly villous to glabrate, granulate, bearing scattered minute glandular droplets; taproot turbinate, simple, very slender to stout and thickened at the top; stems one to many, leafy, strict to diffusely branching, the branches erect, ascending, or decumbent, cylindrical, strongly sulcate, slender to robust and fistulose, the crown not enlarged to considerably expanded; leaves alternate, cauline, also a caducous rosette arising from the crown, entire and narrowly linear, or mostly pinnately to bipinnately divided into 2–70, filiform to narrowly linear segments, the principal divisions 0.3–4 mm. broad, terete, or thickened and fleshy, glandular-punctate; petiole elongate, not clearly distinguishable from the rachis, the bases somewhat clasping, sulcate, the ribs decurrent on the stem; basal rosette leaves quickly caducous, 3–15 cm. long, the petiole bases broadened, strongly ribbed, membranous-margined, covering the crown at first, the darkened remains more or less persistent on robust crowns; cauline leaves crowded to widely spaced, 1.5–10 cm. long, the uppermost shortest; peduncles monocephalous, arising from the stem tips and the upper leaf-axils, erect to divaricate-spreading, acutely ribbed, stiffish, slender to stout and fistulose, more or less enlarged beneath the head in fruit; heads discoid or radiate, campanulate, globose, or hemispherical, 6–17 mm. broad, 6–10 mm. high; phyllaries in 2 appressed, dissimilar series, the lateral margins of the outer often overlapping; outer phyllaries 8 (7–9), united only at the base, rigid, thickened, and often carinate below, the midribs decurrent on the peduncle as angled ribs, the margins and apex thin, ovate to elliptic, 2–3 mm. broad, 4–5 mm. high, obtuse to acute; inner phyllaries free, alternate with, and subequal to noticeably longer than outer in fruit, spatulate to cuneate-obovate, rigidly impressed, yellowish, coriaceous throughout, rounded on the back, the apex connivent in fruit; receptacle naked, plane, with a conical center 1–5 mm. high, obtuse to acute, the disk-flowers spirally arranged; ray-flowers, when present, pistillate, fertile, marcescent; disk-flowers

* Plants mostly perennial in North American species.

bright orange-yellow, 54–363, included within the involucre, to conspicuously surpassing it, 2–4 mm. long, the narrow tube $\frac{1}{3}$ to $\frac{1}{2}$ the corolla length, the throat scarcely flared, the lobes about 0.5 mm. or less long, densely short-villous, the style-branches mostly included, truncate; pappus-scales 5–7 (9), persistent, narrowly obovate to very broadly oval, 1–3 mm. long, the midvein extended into a short awn, or short acuminate to truncate, white, ferruginous in old herbarium specimens; achenes narrowly turbinate, indistinctly 4-angled, densely silky-villous, 2–3 mm. long; chromosome base number $n = 15$.

Type species: *Hymenopappus anthemoides* Juss.

KEY TO THE SPECIES

- 1a. Heads radiate 1. *H. Tweediei*
- 1b. Heads discoid.
 - 2a. Pappus-scales slightly longer to slightly shorter than the disk-corollas; plants at elevations lower than 5000 feet, not found in the Andes.
 - 3a. Plants 10–25 cm. high, diffusely spreading; leaf segments 0.3–1 mm. broad; heads 6–8 mm. broad; peduncles 0.2–4 cm. long. 2. *H. anthemoides*
 - 3b. Plants 25–50 cm. high; leaf divisions 1.5–3(4) mm. broad; heads 9–12(13) mm. broad; peduncles 5–11 cm. long. 3. *H. Cabrerae*
 - 2b. Pappus-scales $\frac{1}{3}$ to $\frac{1}{2}$ as long as disk-corollas; plant found in the Andes, at elevations above 8000 feet. 4. *H. robusta*

1. HYMENOXYS TWEEDIEI ("Tweediei") Hook. & Arn. in Hook. Jour. Bot. 3:323 (1841). *Actinea Tweediei* ("Tweedii") Kuntze, Rev. Gen. Pl. 3, pt. 2:128 (1898). *Actinella Tweediei* Malme, Ark. Bot. II, 24A, n. 6:73 (1932).

Succulent annual, 20–35 cm. high; taproot thickened and enlarged above in mature plants; stems solitary to several, often stout and fistulose, 3–7 mm. broad, branching freely, erect, or ascending in age; leaves fleshy, glandular-punctate, entire, or mostly pinnately to bipinnately divided into 2–9(15) narrow linear segments, 1.5–3 mm. broad, obtuse to acute; basal rosette leaves 4–9(13) cm. long, caducous, the expanded petiole bases persisting for some time; cauline leaves mostly widely spaced, 2–7 cm. long, the upper often entire; peduncles slender to somewhat thickened, 2.5–6 cm. long; heads radiate, campanulate, 9–12 (8–13) mm. broad, 7–10 mm. high; outer phyllaries 8 (7–9), ovate to elliptic, obtuse to acute, 4–5 mm. high, 2–3 mm. broad, the margins often overlapping; inner phyllaries 1–1.5 mm. longer than outer in fruit and the apex noticeably connivent; receptacle with a conical center 2.5–3.5 mm. high, obtuse to acute; ray-flowers 8 (7–9), yellow, pistillate, fertile, the corolla 7–9 mm. long, 4–5 mm. broad, the tube 2 mm. long, the apex 3- or 4-lobed, marcescent, sharply reflexed at maturity with a definite bend just above the tube; disk-flowers 135–196, surpassing the involucre, 3–3.7(2.5–4) mm. long, the throat slightly flaring; pappus-scales 5 or 6 (8), narrowly obovate-elliptic, short-awned, 2–2.8 (1.75–3) mm. long, mostly $\frac{2}{3}$ as long as the disk-corolla, rarely to $\frac{1}{2}$ as long; achene 1.75–2 (2.5) mm. long, narrowly turbinate, indistinctly 4-angled, silky-villous. Plate 2, fig. A; plate 3, fig. B.

Abundant locally in sandy, salty, or clayey soil of the low moist meadows and banks of the Rio Grande, Uruguay, and Paraná rivers of southern Brazil, western Uruguay, and northeastern Argentina, at about 10 to 500 feet elevation. Flowering from November to February. Plate 1.

Types. (1) *Hymenoxys Tweediei*, . . . "capitulis radiatis. . . Rio Grande, and dry pastures, roadsides of Los Loamos, N. Patagonia; Tweedie, (n. 859)" (holotype, K; phototypes, LP, US). The exact location is not indicated, but the "Rio Grande" undoubtedly is Rio Grande do Sul of southern Brazil, as Baker (1884), Arechavaleta (1906), Malme (1932), and Oswaldo Boelcke and Angel Cabrera (personal correspondence in 1959) have stated.

Other representative specimens:

BRAZIL. Rio Grande do Sul St.: west of Rio Grande, *Tweedie in 1837* (K).

URUGUAY. Soriano Dept.: Corte del Uruguay, *Arechavaleta 47* (K).

ARGENTINA. Entre Ríos Prov.: Ceibas, *Cabrera 1244* (LP, US) Gualyeguaychú, *Burkart 4174* (LP). Buenos Aires Prov.: Campaña, *Eyerdam & Beetle 23056* (G, GH, UC).

COUNTRY UNKNOWN. Brazil or Uruguay, *Sello* (P). This may be *Sello 901*, which Baker (1884) cited as "Habitat in Brasilia australi: Sello 901!" and Malme (1932), as "Specimina Sellowiana (n.d. 901.) in Uruguay. . ."

Hymenoxys Tweediei is most closely related to *H. Cabrerae*. The size and growth habits of the two plants, the number of leaf divisions, and the size and shape of the heads are very similar. The presence of ray-flowers and the length of pappus-scales (only about $\frac{2}{3}$ as long as the disk-corollas in *H. Tweediei*) clearly distinguish them.

Lessing, in 1831 (Linnaea 6:518), in his treatment of *Cephalophora* misinterpreted the rayless *Hymenopappus anthemoides* and described it as radiate. Although he stated that it belonged to *Cephalophora* he did not transfer it to that genus. Thus the combination, *C. anthemoides*, is made by inference only and it actually is not a name.

2. HYMENOXYS ANTHEMOIDES (Juss.) Cass., Dict. Sci. Nat. 55:278 (1828). *Hymenopappus anthemoides* Juss., Ann. Mus. Nat. Paris 2:426 (1803). *Hymenoxys Haenkeana* DC., Prodr. 5:661 (1836). *Actinella anthemoides* Gray, Proc. Am. Acad. 13:373 (1878). *Actinea anthemoides* ("anthemodes") Kuntze, Rev. Gen. Pl. 3, pt. 2:128 (1898), fig. 74. *Actinea Haenkeana* Kuntze, l. c. *Hymenoxys Parodii* Johnst., Contr. Gray Herb. 81:98 (1928).

Low spreading annual, 10–20 (5–25) cm. high, sparingly villous to glabrate; taproot mostly slender, to thickened in robust plants; stems several to many, or sometimes 1, often strict and erect at first, ascending to decumbent and diffusely branched at maturity, the branches often at right angles to the stem, mostly slender, 1.5–3 (4) mm. broad; leaves terete, glandular-punctate, pinnately to bipinnately divided into 5–25 (2–70) filiform to narrowly linear divisions, or the uppermost rarely entire, 0.3–1 (1.5) mm. broad; basal rosette leaves caducous, 3–7 (10) cm. long, the petiole bases broadened, the remnants often not persisting; cauline leaves mostly densely clothing the

stems, often surpassing the heads, 1.5–3 (6) cm. long; peduncles short, 0.2–3 (4) cm. long, stiffish, mostly slender and divaricately spreading; heads discoid, many, campanulate to strongly globose, 6–8 (5–9) mm. broad, 6–7 mm. high; outer phyllaries 8, elliptic, obtuse to acute, 4–5 mm. high, 2–2.5 (1.7–3) mm. broad; inner phyllaries conspicuously longer (1.5–2 mm.) than outer, rigidly impressed, the apex markedly connivent in fruit, nearly closing the head; receptacle with a conical center 1.5–2.5 (1–3.5) mm. high, obtuse; disk-flowers 54–106, mostly included within the involucre, barely extruding in fruit, 2–2.5 (3) mm. long, pappus-scales 5–6 (7), subequal, 2–2.5 (1.5–3) mm. long, equal to disk-corolla, or about 0.5 mm. longer, or sometimes to about 0.5 mm. shorter, obovate-elliptic, short-acuminate, or mostly with an awn 0.3–0.5 mm. long, the awns protruding from the closed heads in fruit; achenes narrowly turbinate, 2.5–3 mm. long, silky-villous; $2n = 30$. Plate 2, fig. D; plate 4, fig. A.

Weed of low places in moist salty or sandy soil, along salt marshes, swamps, ravines, river banks, roads, and fields, at 10 to 4000 feet elevation; the most widespread *Hymenoxys* in South America, occasional from southern Brazil southward to Uruguay, common in northeastern and central Argentina. Flowering principally October to December, but plants can be found in flower from August to March. Plate 1.

Types. (1) *Hymenopappus anthemoides*, "ex Bonaria"; collected by Comermerson in 1767 in Buenos Aires (holotype, P; isotype, P; phototypes, F, US). (2) *Hymenoxys Haenkeana*, "in Peruvia legit cl. Haenke . . ." in 1790 (holotype, G-DC; isotype, P; phototypes, F, GH, US). This plant is typical *H. anthemoides*. DeCandolle was doubtful whether it was distinct when he described it, for he stated, "An ab *H. anthemoides* mihi ignota satis distincta?" Undoubtedly Haenke collected this plant in Argentina, not Peru. He had ample opportunity. According to Presl (1825), Lasègue (1845), Pennell (1945), and Chardon (1949), Haenke left Buenos Aires in February, 1790, crossed Argentina and the southern Andes, arrived in Santiago and Valparaíso, Chile, in April, collecting some 1400 plants on the way. Moreover, *Hymenoxys anthemoides* is very common in Argentina, but has not been collected in Peru. The confusion caused by this locality error has resulted in the distinct Peruvian species, *H. robusta*, being treated as *H. Haenkeana*. (3) *Hymenoxys Parodii*, "Bañado de Flores, near Buenos Aires, Nov. 13, 1927, L. R. Parodi 8170a" (holotype, GH; isotype, LP). This plant is erect with very short peduncles, a characteristic of many young plants; and the pappus is shorter than the disk-flowers, which often occurs (*e.g.*, *Venturi* 2587, Tucumán Prov., and *Rodrigo* 614, Corrientes Prov.). It has the typical narrow leaves, the small heads with the disk-flowers included in the involucre, and the inner phyllaries conspicuously longer than the outer in fruit.

Other representative specimens:

BRAZIL. Rio de Janeiro St.: Cabo Frio, *Pimentel* 20880 (LP, US). Rio Grande do Sul St.: Rio Grande do Sul, *Saint-Hilaire* 2250 (P).

URUGUAY. Artigas St.: Cuareim, *Herter* 787a (US); Bella Unión, *Herter* 781b (M). Salto St.: Daymán, *Osten* 5247 (US); San Antonio, *Rosengurtt* B4882 (F, MO). Paysandú St.: Paysandú, *Rosengurtt* B2183 (GH, LP, NY). Río Negro St.: Rincón de las Gallinas, *Rosengurtt* B4080 (LP, US); Bellaco,

Chebataroff 3905 (LP). Montevideo St.: Montevideo, *Isabelle* in 1838 (F, GH, K, NY, P), *Gibert* in 1859 (K), *Courbon* in 1856 (P), *Cunningham* in 1866 (K), *Fruchart* in 1876 (P), *Herter et al.* 781 (G), *Chebataroff* 300 (LP).

ARGENTINA. Formosa Prov.: Pirané, *Morel* 107 (LIL); Los Matacos, *Eyer-dam & Beetle* 22941 (G, GH, MO, UC); Pelagá, *Piero* in 1945 (BM). Chaco Prov.: Las Palmas, *Jørgensen* 2031 (GH, UC, US); Resistencia, *Rojas* 11571 (LP). Salta Prov.: Salta, *Spegazzini* 13801 (LP), *Fries* 558 (US). Catamarca Prov.: El Luncho, *Jørgensen* 1521 (GH, MO). Tucumán Prov.: El Timbo, *Venturi* 2587 (LP, US); Bella Vista, *Schreiter* 2998 (UC); Sta. Ane, *Baer* 58 (G); Medina, *Spegazzini* 10107 (LP); Río Sali, *Spegazzini* 13799 (LP); Pueblo Nuevo, *Lillo* 2371 (UC); Salinas el Timbo, *Schreiter* 6524 (UC); Estación Arasz, *Schreiter* 3994 (UC). Santiago del Estero Prov.: Clodomira, *Cuezso* 2345 (LIL); Turena, *Maldonado* 203, and 433 (LP); Añatuya, *Huidobro* 3110 (LP, P); Termas, *Huidobro* 3026 (G); Sumampa, *Maldonado* 1552 (LP); La Florida, *Boleño* 1324 (P). Santa Fe Prov.: Tostado, *Job* 1095 (LP); Ceres, *Kuntze* in 1892 (NY, US); San Cristóbal, *Ragonese* 2377 (LP); Laguna Paiva, *López* 3475 (LP); Berro, *Parodi* 11240 (GH). Corrientes Prov.: Corrientes, *Balansa* in 1875 (P), *Hirschhorn* 1450 (LP); Estación Herlitzka, *Ybarrola* 3318 (BM, LIL); Mercedes, *Rodrigo* 614 (LP, P); Empedrado, *Pederson et al.* 1158 (G); Santillán, *Pederson et al.* 4634 (G). Entre Ríos Prov.: Ceibas, *Cabrera* 12442 (LP, US); Paraná, *Boelcke* 1245 (LP); Concepción del Uruguay, *Lorentz* 945 (BM, K, P), *Cabrera* 3180 (LP); Gualaguaychú, *Cabrera* 3059 (LP, US); La Paz, *Burkart* in 1960 (US). (Also greenhouse seedlings, *Baldwin* 15580 (US).) Córdoba Prov.: Cruz del Eje, *Meyer* 12842 (US); Córdoba, *Lorentz* 88 (BM, G, K, M) and in 1878 (K), *Hieronymus* 583 (P) and 2881 (G) and in 1877 (F, G, GH, K, P, US), *Kuntze* in 1891 (NY) and in 1892 (F), *Stuckert* 3204 and 4689 and 7378 (G), *Kurtz* 9199 (NY); Villa Dolores, *Varela* 430 (LIL, US); Tancacha, *Scala* in 1924 (LP, NY). San Luis Prov.: Baja de los Velez, *Maldonado* 1240 (LP); San Martín, *Varela* 526 (LIL); Fortuna y Anchorena, *Guiñarzu* 102 (LP). Buenos Aires Prov.: San Nicolás, *Parodi* 8887 (GH); Pergamino, *Parodi* 8840 (LP); San Pedro, *Cabrera* 5607 (LP, UC, US); Los Cardales, *Nicora* 2881 (LP); Las Palmas, *Hunziker* 7260 (G); Escobar, *Clos* 3200 (LP); Buenos Aires, *Tweedie* (K), *Balansa* in 1875 (P); Quilmes, *Venturi* 88 (UC); Estancia Bell, *Dawson* 802 (LP); Tolosa y Ensenada, *Cabrera* 1542 (LP); La Plata, *Tweedie* (BM), *Cabrera* 10664 (LP, US); Cambaceres, *Cabrera* 146 (LP, US); Los Talas, *Cabrera* 2480, (LP, US); La Plata y Magdalena, *Humbert* in 1948 (P); Lavalle, *Cabrera* 8507 (LP). Capital Federal: Palermo, *Berg* 210 (LP); San José de Flores, *Spegazzini* 12007 (LP).

Hymenoxys anthemoides shows more variation than any of the South American species, as can be expected in a widely distributed taxon, but it differs from the other species in so many characters that it is clearly distinguishable from them in any of its various forms. Most of these characters were discussed under important morphological and diagnostic characters, but it was not mentioned that the inner phyllaries are conspicuously longer than the outer in fruit. Those of *H. Tweediei* are

also definitely longer, but usually not as conspicuously so as in *H. anthemoides*.

The probable origin of this species and its close relationship to *H. odorata* will be discussed in the treatment of the North American species of *Hymenoxys*.

3. *Hymenoxys Cabrerae* K. F. Parker, spec. nov.

Herba annua; caules solitarii vel plures, fistulosi, striati, ramosi, erecti; folia crassiuscula, pinnatim vel bipinnatim divisa, vel aliqua integerrima, segmentis remotis linearibus obtusis, 1.5–3 (5) mm. latis; capitulae discoideae, 9–13 mm. latae; pedunculi erecti, 5–11 cm. longi, sursum incrassati, profunde sulcati; receptaculum planum, in medio conicum, 3–4.5 mm. altum; involucri bracteae interiores in fructu conniventes; pappi paleae aequales, quam corollae paulo breviores vel paulo longiores; achaenia tereti-turbinata, longe sericeo-villosa, 2.5–3 mm. longa.

Fleshy annual, 20–50 cm. high, thinly villous to glabrate; taproot thickened, enlarged and 5–10 mm. broad at the top; stems fleshy, one to numerous, strict to freely branching, erect to tardily ascending, 4–7 mm. broad above the crown, the crown enlarged, 1–1.5 (2) cm. broad; leaves glandular-punctate, entire, or mostly pinnately to bipinnately divided into 2–9 (16) linear to linear-oblong divisions, 1.5–3 (5) mm. broad; basal leaves caducous, 5–12 cm. long, the remains persisting; cauline leaves not crowded. 3–8 cm. long, or the uppermost shorter; peduncles monocephalous, erect, 5–11 cm. long, often fistulose; heads discoid, campanulate to globose, 9–12 (8–13) mm. broad, 7–10 (12) mm. high; outer phyllaries united at base, 8 (7–9), ovate to elliptic, 4–5 (6) mm. high, 2.5–3 mm. broad, base and center thickened, rigid, often carinate, the midribs decurrent on the peduncle as angled ribs, the apex and margins thin, sparingly tomentose and glandular-punctate; inner phyllaries free, subequal to or slightly longer than outer in fruit, coriaceous, rigidly impressed, the apex cuspidate and markedly connivent in fruit; receptacle with a conical center 3–4.5 mm. high, sharply acute to obtuse; disk-flowers perfect, 115–200, extending well above the involucre, 2.3–3 mm. long, the tube narrow, short, villous above, about half the corolla length, the throat narrow, the lobes less than 0.5 mm. long, densely short villous, the style branches included; pappus-scales 6 or 7 (5–9), narrowly obovate-elliptic, 2–3 mm. long, slightly longer than the corolla to $\frac{3}{4}$ as long as the corolla, all sharply awned; achene narrowly turbinate, terete to somewhat 4-angled, 2–2.5 mm. long, densely silky-villous. Plate 2, fig. C; plate 3, fig. A.

Found in sandy or salty soil in the same types of habitat as *H. anthemoides*, at 10 to 1650 feet elevation; known only from eastern Argentina, from southern Santa Fe to Chubut provinces, but principally in southwestern Buenos Aires. Flowering November to January. Plate 1.

Types. (1) Partido de Maipú, Camino de Madariaga a Las Armas, Buenos Aires, A.L.Cabrera 8588, December 2, 1944 (holotype, US; isotypes, K, LP, UC).

Other representative specimens:

ARGENTINA. Santa Fe Prov.: Rosetti, Covas & Ragonese 3799 (LP). Buenos Aires Prov.: Vilela (Las Flores), Parodi 13013 (GH); Carhué, Wetmore 831

(US); Rivera, *Hirschorn in 1928* (LP); Cerros y Laguna de Puán, *Scala in 1928* (LP, P); Bahía Blanca, *Spegazzini 10116* (LP); Coronel Dorrego, *Eyerdam, Beelle & Grondona 23738* (G); Monte Hermosa, *Carette in 1916* (LP); Villarino, Salitral de la Vidriera, *Cabrera 6663* (LP, US). Río Negro Prov.: Patagonia, 50/3°, *Moreno & Tonini 575* (NY). Chubut Prov.: no locality indicated, *Carette* (LP).

This large, erect plant has long been recognized by Cabrera (1941, 1953) as distinct from *H. anthemoides*, but regarded as conspecific with *H. Parodii* and the Andean plant, *H. robusta*, which historically has gone under the name *H. Haenkeana*. *Hymenoxys Parodii* and also DeCandolle's type of *H. Haenkeana* are both *H. anthemoides*. (These plants are discussed under types for that species.) Since this plant is distinct from both *H. anthemoides* and the Andean plant, *H. robusta*, it is here described as a new species, *H. Cabrerae*.

4. *Hymenoxys robusta* (Rusby) K. F. Parker, comb. nov. *Cephalophora robusta* Rusby, Mem. Torrey Club 3:63 (1893).

Stout annual or sometimes biennial, 20–64 cm. high, the herbage rank-smelling, sparingly villous to glabrate, granulate; taproot stout and thick, 10–20 cm. long, often much enlarged above, 0.5–2 cm. broad; stems one to many, fistulose, strongly sulcate, 3–6 mm. broad, branching freely but not divaricate, the branches erect or ascending, rarely decumbent in age, the crown fleshy and considerably enlarged, 1–3 cm. broad; leaves thickish, glandular-punctate, pinnately to bipinnately divided into 5–21 (2–35) linear segments, or a few entire, the divisions 1.5–4 (1–5) mm. broad, obtuse to acute; basal rosette leaves caducous, 5–15 cm. long, the expanded bases 6–17 mm. broad, strongly sulcate, membranous-margined, the remnants persistent; cauline leaves numerous, 3–8 (10) cm. long; peduncles stout, fistulose, enlarged beneath the head, sharply sulcate, 3–5 (7) cm. long; heads discoid, broadly campanulate to hemispherical, 12–15 (11–17) mm. broad, 8–10 mm. high; outer phyllaries 8, ovate to rhomboidal, obtuse to acute, 4–5 (6) mm. high, 2.5–3 (4) mm. broad, thickened below, thin and foliaceous above, tomentose, the margins somewhat erose and membranous; inner phyllaries subequal to scarcely longer than outer in fruit, the cuspidate tip connivent; receptacle with a concical or ovoid center 2.5–4 (5) mm. high, obtuse to acute; disk-flowers 215–363, conspicuously surpassing the involucre, 2.5–3 (3.5) mm. long, the lobes about 0.5 mm. long; pappus-scales 5 (6), very broadly oval-obovate, 1–1.5 (2) mm. long, only $\frac{1}{2}$ to $\frac{1}{2}$ as long as disk-corolla, erose, some, or rarely all with a minute awn, the others with apex truncate to acute; achenes narrowly turbinate, indistinctly 4-angled, 2.5–3 mm. long, densely silky-villous. Plate 2, fig. B; plate 4, fig. B.

Grows in sandy, salty, or clayey soil of salt marshes, lakes, river banks and dry hillsides; high plateaus and river valleys on the eastern side of the Andes from southern Peru southward through south-central Bolivia, and along the Río Grande de Jujuy in northwestern Argentina, at 8300 to 13,300 feet elevation. Flowering from November to June. Plate 1.

Type. *Cephalophora robusta*. "Vic. Cochabamba, 1891 (925)," Miguel Bang, Bolivia (holotype, NY; isotypes, BM, G, GH, K, M, US).

Other representative specimens:

PERU. Cusco Dept.: Urubamba Valley, *Stafford 1090* (K); Oropesa, *Pennell 14202* (F, GH, K, NY, PH, US); Huasco, *Herrera 3019* (F); Tinta, *Vargas 931* (F).

BOLIVIA. Cochabamba Dept.: Cercado, *Steinbach 9838* (F, G, GH, K); Cochabamba, *Kuntze in 1892* (F, NY, US). Oruro Dept.: Pazña, *Buchtien in 1908* (M, US). Potosí Dept.: Termal lake of Tacopaya, *Cárdenas 242* (GH); Potosí, *D'Orbigny 1333* (GH, P); Tupiza, *Fiebrig 3108* (BM, G, GH, K, M, P, US). Exact locality unknown: Bolivia, *Bridges* (BM, K).

ARGENTINA. Jujuy Prov.: Iturbe, *Soriano 676* (LP), Humahuaca, *Schreiter 10909* (GH), *Parodi 9661* (GH), *Lorentz & Hieronymus 834* (G), *Herrera 420* (BM); Huacalera, *Cabrera 11970* (LP, US), *Pearce in 1864* (BM, K); Tilcara, *Cabrera 7646* (GH, LP, US), *Pereyra in 1925* (UC); Volcán, *Schreiter 2674* (LIL), *Venturi 6279* (US) and *4921* (GH, US), *Lillo 4642* (UC); Jujuy, *Lorentz in 1877* (K).

Hymenoxys robusta historically has been treated as part of *H. Haenkeana* DC., but it cannot bear that name since that plant, as discussed under *H. anthemoides* and mentioned under *H. Cabrerae*, is typical *H. anthemoides*. Although Rusby (1893) described this plant as a new species, he placed it in the genus *Cephalophora*, where it has been completely overlooked and not, heretofore, transferred to its rightful place in *Hymenoxys*.

This plant is most closely related to *H. Cabrerae* which it resembles, but clearly is a distinct species. It occurs only in certain river valleys of the Andes at high elevations. Aside from its distinct geographical distribution, its large hemispherical heads and very short broad pappus-scales distinguish it.

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A SYNOPSIS OF ERRAZURIZIA

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The genus *Errazurizia* Phil. (*Leguminosae Psoraleae*) as revived and expanded by Johnston (in Proc. Calif. Acad. Sci. ser. 4, 12: 1042, 1924) and accepted by Wiggins (in Contrib. Dudley Herb. 3: 43, Pl. VI, VII, 1940) has consisted up to the present of three species, two of them native to Baja California and coastal Sonora and one to the desert fog belt of northern Chile. Both North American species were first described in the genus *Dalea* Mill., but they differ greatly from the genuine daleas in their flower which is not at all or only very obscurely papilionaceous, the inner whorl of the perianth being composed of five separate petals disposed radially to form a more or less tubular corolla. The errazurizias are low shrubby plants, glandular and pungently aromatic, with subsessile flowers arranged in spiciform racemes. The fruits are far exserted from the broad-toothed, turbinate campanulate calyx and enclose a single massive brown seed 5-6 mm. long. Rydberg (in Amer. Jour. Bot. 25: 427, 428, Pl. XXVIII, figs. M and N, —1928) disagreed with Johnston's redefinition of *Errazurizia* and maintained it as a monotypic genus distinguished from the Mexican species, which formed a separate genus *Psorobatus* Rydb., in details of the flower. However there can be no doubt whatever, I think, that the Chilean *E. multifoliolata* (Clos) Jtn. and *E. megacarpa* (Wats.) Jtn. are more closely related to one an-

other than either is to *E. Benthami* (Bdg.) Jtn. The corolla of *E. multifoliolata* is a little more irregular, with the keel and wing-petals differentiated into a definite claw and blade, not simply oblanceolate as in the Mexican species. The differences are of specific rather than generic importance and cannot outweigh the close resemblance in many other features. Characters common to *E. multifoliolata* and *E. megacarpa* are the flexible, weakly woody branches, the long and narrow flower-spikes, and especially the short, stout style which is abruptly bent inward below the stigma and bears (cf. *Eysenhardtia* H.B.K.) a large sessile gland at the bend. This pair of species forms the typical section of the genus.

The second Baja California *Errazurizia* is *E. Benthami*, found only along the Pacific coast of the peninsula, whereas *E. megacarpa* is confined to the shores of the Gulf. It differs from the foregoing in being an intricately branching, stiffly woody or subspinescent shrublet with rigid terminal branchlets, short and dense, comparatively few-flowered spikes, and a much longer, slender, glandless style terminating in an enlarged capitate stigma. It may well form a monotypic sect. *Psorobatus* (Rydb.) Barneby.¹

We can now add to *Errazurizia* a fourth member, *E. rotundata* (Woot.) Barneby², a rare species apparently endemic to the drainage of the Little Colorado River in northern Arizona, where it is known positively from only three stations lying within a radius of less than one hundred miles. The Arizona species most closely resembles *E. Benthami* in its twiggy fruticose habit of growth, short flower-spikes, and filiform glandless style; but the stigma is here minute and punctiform, the corolla is either reduced to the banner or more commonly altogether suppressed, and the stamens are greatly exserted, the filaments of the ripe anthers becoming almost twice the length of the calyx. It is probably the most highly modified of an already highly specialized genus and deserves to figure as type of a third section, sect. *Exostemon* Barneby.³

The recorded history of *E. rotundata* goes back to 1892 when

¹ *Errazurizia* sect. *Psorobatus* (Rydb.) Barneby, stat. nov., based on *Psorobatus* Rydb. in N. Amer. Fl. 24: 41 (1919). Generitypus: *Dalea Benthami* Bdg., *P. Benthami* (Bdg.) Rydb., *Errazurizia Benthami* (Bdg.) Jtn.

² *Errazurizia rotundata* (Woot.) Barneby, comb. nov., based on *Parryella rotundata* Woot. in Bull. Torr. Club 25: 457 (1898).

³ *Errazurizia* sect. *Exostemon* Barneby, sect. nov., a sect. *Psorobato* floribus apetalis vel corolla in vexillum parvulum membranaceum reducta imperfectis, stigmatibus minutis imo punctiformis nec capitato-pileiformis, staminibus valde exsertis calyce subduplo longioribus absimilis. Sp. unica: *E. rotundata* (Woot.) Barneby.

Elmer O. Wooton, the noted New Mexican botanist, discovered a single shrub on the sandstone desert north of Winslow in Navajo County. The specimens were in flower (US), and as the flowers were all apetalous the species was referred to *Parryella* Gray, a hitherto (and now again) monotypic genus of shrubby *Psoraleae* allied to *Amorpha* L. and *Eysenhardtia* H.B.K. The genuine *Parryella* is a tall pliant shrub characteristic of sandy washes and stream banks on the high deserts of northern Arizona and New Mexico. It does not resemble any *Errazurizia* in habit, and resembles the sympatric *E. rotundata* only in the loss of petals. The calyx of *Parryella* is much smaller than that of *Errazurizia* and lacks the foliaceous teeth densely hairy within; the glands of the foliage are immersed and not prominent or mammiform; the small, compressed pod and small seed recall *Amorpha* rather than *Errazurizia*; and the leaflets are filiform and not rounded and notched. Very likely *Parryella* is a specialized offshoot of *Amorpha* which has lost the vexillum and become adapted to an arid climate. In this connection it must be recalled that Kearney & Peebles (Fl. Pl. Ariz. 452, —1942) reported a specimen (*Harrison 5532*) from the Petrified Forest supposedly intermediate between *Parryella filifolia* and *P. rotundata*. The specimen has not been traced, but as the record was dropped from Arizona Flora (1951) by Kearney I presume that an error of interpretation was involved.

Historically the first collection of *E. rotundata* was not that of Wooton, but goes back to June 11, 1890, when Marcus E. Jones encountered the species at Willow Spring, a seep and tank at the edge of Moenkopi Wash a few miles north of Cameron in Coconino County. The specimens collected here were in fruit, and were referred by Jones to a new species of *Dalea*, for which he chose the epithet *nummularia*, descriptive of the very numerous little leaflets of almost round outline. Owing to the incompleteness of the material, the proposition was left unpublished for many years. Finally Jones discovered in Utah a genuine shrubby *Dalea* in the flowering stage and even though it does not at all closely resemble *E. rotundata* in foliage or other details he confused the two and *D. nummularia* Jones (Cont. West. Bot. 18; 41, —1935) was based on a mixture of two species. Although the epithet was suggested by the *Errazurizia*, the name is properly preserved for the *Dalea* element from Utah.

In the summer of 1942 Ripley & Barneby, unaware of *Dalea nummularia*, happened by chance on the *Errazurizia* at Willow Spring (cf. Leaflet West. Bot. 4: 9,—1944) and the species was collected in 1952 by Chester F. Deaver at Moenave a few miles distant (*Deaver 3637*, CAS). All of these modern collections bore pods alone and the flower was known until very recently only from the original Winslow station. At my suggestion Prof. Deaver (with Dr. Delzie Demaree) returned to Moenave on April 22, 1961, and obtained a beautiful set of specimens in flower (*Deaver 5907*, CAS NY, US). Part of the collection sent by air mail to New York was studied in fresh condition and provided the occasion for the present note.

It is always difficult to interpret affinities of genera or species characterized by reduced flowers, for it is precisely the lacking parts which provide the crucial clues. In the case of *Parryella rotundata* there has been a reasonable basis for evaluating it as an apetalous *Dalea*, for the exerted pod, the large seed, and even the foliaceous-toothed calyx can be matched rather closely in some members of the shrubby section *Xylodalea* Wats. Its relationship seemed closer in any case to *Dalea* than to *Parryella*. Most of Deaver's specimens are apetalous like Wooton's holotype, but in one fresh specimen I found low on one spike a few flowers provided with a small vexillum (fragm., CAS, NY). This petal is oblanceolate, about 5.5 mm. long, seated at base of the staminal column but not adherent; it is of membranous texture and pale brownish-purple color, and bears a few silvery hairs dorsally near the summit. Except for the thinner texture it closely resembles the banner of the other *errazurizias*, especially that of *E. Benthami*, and is quite unlike that of any true *Dalea*, which consists of a stalk-like claw and a superimposed blade of more or less cordate outline, always glabrous on the back. The reduction of the flower to the vexillum is characteristic of *Amorpha* L., some species of which have subsessile flowers and prickle-shaped glands as in *E. rotundata*, and the Arizona plant might now perhaps be referred to this genus on technical grounds. However the vexillum in *Amorpha* is relatively broad and enfolds the stamens, the filaments are free almost to the base, and the fruit is quite different, being obliquely obovate and laterally compressed. It is of equal importance that *E. rotundata* does not suggest any particular species of *Amorpha* in habit or appearance, whereas the similar-

ity to *Errazurizia Benthami* is quite close not only in facies but in numerous details. Features common to both are the orange, nipple-shaped (when dry purplish and prickle-shaped) glands on the foliage; the stipules tipped with with a caducous gland; the broadly oblong-obovate to suborbicular leaflets; the very short (0-1 cm.) peduncles and spiciform racemes; and the calyx (6-9 mm. long) of turbinate campanulate form, becoming prominently 10-ribbed, with ovate-oblong to obovate foliaceous teeth densely silky within.

In summary I append a key to the species and sections of *Errazurizia* and a brief description of *E. rotundata*.

KEY TO THE SPECIES AND SECTIONS OF *ERRAZURIZIA*

1. Weakly woody shrubs with flexible branches; spikes long and narrow, 20-120-flowered, the axis 5-25 cm. long in fruit; style short and stout, not over 2.5 mm. long, abruptly bent inward below the stigma and bearing a large sessile gland at the bend (sect. *ERRAZURIZIA*).
 2. Leaflets 11-23, calyx 4.5-5 mm. long, the tube 2.4-2.8 mm. long, scarcely longer than the teeth; banner densely pubescent dorsally; keel- and wing-petals differentiated into claw and blade, the former decidedly so, its blades obliquely triangular, nearly as broad as long; Chile....
.....*E. trifoliolata* (Clos) Jtn.
 2. Leaflets 9-15; calyx 5.7-7 mm. long, the tube more deeply campanulate, 3.2-5 mm. long, decidedly longer than the teeth; banner glabrous or only feebly pubescent dorsally; keel- and wing-petals oblanceolate, subsymmetrical, not or very obscurely differentiated into blade and claw; Gulf of California, Sonora and Baja California.....
.....*E. megacarpa* (Wats.) Jtn.
1. Low, intricately branching, stiffly woody or subspinescent shrubs with rigid branches; spikes short and dense, 8-25 (30)-flowered, the axis 1-4 cm. long in fruit; style slender, evenly incurved up to the stigma, about 5 mm. long, glandless.
 3. Stipules persistent, becoming rigid and spinescent; petals 5, somewhat fleshy, marcescent; filaments not exerted, about equaling the calyx (sect. *PSOROBATUS*); leaflets 9-11; Pacific coast of Baja California and adjoining islands.....*E. Benthami* (Bdg.) Jtn.
 3. Stipules deciduous; petals 0 or vexillum only, the latter membranous, deciduous; filaments greatly exerted, about twice as long as the calyx or banner (sect. *EXOSTEMON*); leaflets (17) 29-61; northern Arizona (Coconino and Navajo counties).....
.....*E. rotundata* (Woot.) Barneby

ERRAZURIZIA ROTUNDATA. A low, tortuously woody shrublet up to 3 dm. tall, spreading clonally (acc. Deaver) and forming rings (presumably by rhizomes or suckers), the herbage strigulose-cinereous or -canescent, the

⁴ For distribution of the Mexican species cf. Wiggins in Contrib. Dudley Herb. 3: 44 (1940).

stems, leaf-rachis and lower surface of the leaflets beset with many prominent, orange or purple, prickle-shaped glands; stipules slenderly subulate, 0.5–1.5 mm. long, glabrate distally, tipped with a caducous gland; leaves 3–13 cm. long, subsessile, with persistent, recurving rachis and (17) 29–61 broadly oblong-obovate to orbicular, obtuse or shallowly emarginate leaflets 1–8 mm. long, gradually diminishing upward along the rachis; peduncles terminal to lateral branchlets, 0–1 cm. long; spikes shortly 6–14-flowered, the axis not over 2 cm. long in fruit; calyx 5–6.5 mm. long, turbinate-campanulate, the tube prominently 10-ribbed and glandular in the intervals, the broadly obovate teeth 1.5–2.3 mm. long, obtuse, silky-pubescent within; banner, when present, oblanceolate, flat or nearly so, openly notched at apex, about 5.5 mm. long and 2 mm. wide, thinly pubescent dorsally toward the tip; wings and keel 0; filaments greenish-yellow, monadelphous at base, (7) 8–12 mm. long when fully grown; anthers bright yellow, about 1–1.3 mm. long; pod obovoid-ellipsoid, 9–11 mm. long, cuneately narrowed at base, prominently glandular; seed fusiform, chestnut-brown, about 6 mm. long.

Hilltops and rock-ledges, on red or white sandstone, 4850–5000 ft., rare and local, known only from northern Arizona (near Winslow; Willow Spring; Moenave). Flowering in April, in fruit from mid-May onward.

A SECOND STATION FOR *BLENNOSPERMA BAKERI*. In 1961 during an excursion devoted to reconnoitering California spring annuals to be included in the Index Seminum of the University of California Botanical Garden, I noticed a *Blennosperma* which appeared to be *B. Bakeri* Heiser, then known only from a single locality within the city limits of Sonoma. Seed and specimen plants were collected on a subsequent visit and herbarium material has been deposited at the California Academy of Sciences, in the Jepson Herbarium (University of California), and with Dr. R. Ornduff, who confirmed the identification.

This new station is almost due south of Sonoma, a little over 4 miles south of El Verano on Arnold Drive and about 1 mile north of State Highway 37. The colony closest to the road is in an easy place to spot because a very large eucalyptus tree stands on the edge of the opposite side of the road. The plants were found in rather open colonies in the lower-lying parts of a pasture of about 40 acres. They did not give mass color but they did make a definite show that could be seen from a car. As there is much low ground in the area, the species may actually be found to be even more widespread.—WAYNE RODERICK, University of California Botanical Garden, Berkeley.

CLARKIA STELLATA, A NEW SPECIES
FROM CALIFORNIA

BY THEODORE MOSQUIN

Calgary, Alberta, Canada

Clarkia stellata Mosquin, spec. nov. Herba erecta, altitudine ad 1 m.; caulibus simplicibus vel superne ramosis; foliis lanceolatis, ellipticis vel ovatis, integris, 1-5 cm. longis, 0.5-2 cm. latis; inflorescentiae axe ad apicem recurvato; calycis tubo 1.5-2 mm. longo, limbo 5-7 mm. longo, 0.75-1 mm. lato; petalis obovatis, 6-7 mm. longis, 3-4 mm. latis, superne trilobatis, ad basim paulo ampliatis; staminibus 8, plerumque stigmatе adhaerentibus; stigmatе quadrifido, lobis brevibus; stylo quam stamenes paulo breviorе; ovario 5-15 mm. longo, 4-canaliculato, in maturitate molli et limoso; capsula sicca quadrangulata, plus minusve recta.

Erect, as much as a meter tall; stems simple, or in larger plants much branched, with short upwardly curled hairs, often almost glabrous; leaf-blades lanceolate to elliptic or ovate, entire or nearly so, 1-5 cm. long and 0.5-2 cm. broad, petioles 0.5-3 cm. long; rachis of inflorescence recurved in bud, becoming erect as the flowers open; mature buds ellipsoid, 6-8 mm. long and 2-3 mm. broad, cuspidate at apex; hypanthium 1.5-2 mm. long, light green within; sepals 5-7 mm. long, 0.75-1 mm. broad; petals obovate, 6-7.5 mm. long, 3-4 mm. broad, shallowly 3-lobed, the centre lobe about 1 mm. longer than the lateral lobes, lavender-purple, not flecked, red-purple at base; stamens 8; anthers pale, becoming light yellow when dry; filaments lavender below; pollen yellow; stigma dull purple, 4-lobed, the lobes inconspicuous; mature style lavender above, pale below, shorter than stamens; ovary 5-15 mm. long, puberulent, subterete, nearly sessile or with a pedicel as much as 4 mm. long; immature capsule 4-grooved, becoming soft and slimy, beaked, the beak as much as 3 mm. long; mature capsule 2-2.5 mm. long, 2-3 mm. broad, dry and quadrangular, often with red streaks, straight or slightly curved.

Type. Humbug Road, 1.2 miles west of its junction with Humboldt Road, west of Lake Almanor, Plumas County, California, *Mosquin 3332*, July 2, 1959 (LA).

Distribution. Known only from Plumas and Yuba counties in California.

Specimens examined. PLUMAS COUNTY: Forest Lodge near Greenville, *Eastwood 14,456* (CAS); 3 miles north of Greenville, along highway, *Gould 464* (POM; UC); Prattville, *Heller & Kennedy 8813* (CAS, DS, POM); Prattville, *Heller & Kennedy 8778* (DS, UC); near Prattville, *Howell 2081* (CAS); Feather River Highway 0.8 mile north of road to Caribou, *Lewis & Vasek 743* (LA); highway from Sattley to Lake Almanor (State Highway 89) opposite road to Camp Layman, *Lewis & Vasek 739* (LA); about 1 mile south-east of Spring Garden along highway to Lake Almanor, *Mosquin 3328* (LA); on road to Prattville 4.1 miles from junction with road from Chester to Mineral, *Mosquin 3331* (LA); Humbug Road, 1.2 miles west of its junction with Humboldt Road, west of Lake Almanor, *Mosquin 3332* (LA, type; UC, DAO, GH, K). YUBA COUNTY: highway to Downieville, about 8 miles northeast of Camptonville, *Bacigalupe 1584* (DS).

The chromosome number is $n=7$, based on examination of one plant from the type locality (*Mosquin 3332*), and of one garden-grown plant from each of seed collection numbers *Mosquin 3153* and *3143* (herbarium collections *Mosquin 3328* and *Mosquin 3331* respectively). In addition, garden progeny have been examined from the following seed collections made by Mr. C. R. Quick: 1.5 miles southeast of Deane's Valley, southwest of Quincy; road from Indian Falls to Greenville, 4.5 miles north of the Feather River Highway. Both localities are in Plumas County. The accession numbers are *Lewis 895* and *896* respectively.

Clarkia stellata is most closely related to *C. Mildredae* (Heller) Lewis & Lewis ($n=7$), but differs from the latter in having much smaller flowers, stamens shorter than the style, and pollen yellow rather than dull yellow-grey to dark blue-grey. The style in *C. stellata* is mature and in contact with the anthers when the flowers open. Consequently, it is normally autogamous in contrast to the outcrossing, strongly protandrous *C. Mildredae*. Hybrids between these two species are easily made in the garden but are of low fertility.

Clarkia stellata is most likely to be confused with the small-flowered autogamous races of *C. rhomboidea* ($n=12$). It can be distinguished from *C. rhomboidea* in Plumas and Yuba counties by its generally smaller flowers, lobed unspotted petals, and yellow rather than dull yellow-grey to dark blue-grey pollen.

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TWO NEW SPECIES OF ARCTOSTAPHYLOS
FROM CALIFORNIA

BY JAMES B. ROOF

Berkeley, California

The two following manzanitas from coastal California are so clearly distinct from all other members of the genus *Arctostaphylos* that they should no longer remain without specific names.

The first is a ground-covering shrub from northern San Mateo County:

Arctostaphylos pacifica J. B. Roof, spec. nov. Frutex decumbens ramis radicantibus, 2–4 dm. altus, 1–3 m. latus, cortice dilute fusco, non rubido, ramulis puberulis; foliis pallide viridulis, condensis, variabilibus, saepe rotundatis raro lanceolatis, interdum apice truncatis et cuneatis basi, 10–18 mm. longis, 6–11 mm. latis, crassiusculis, coriaceis, utrinque reticulatis, saepe serrulatis, paululum scabridis, petiolis 1 mm. longis puberulis; inflorescentiis sparsis, bracteis et rhachidibus minute puberulis; pedicellis glabris, usque ad 1.5 mm. longis; corollis albis, pertenuibus, 4 mm. longis, sub 2 mm. latis; ovario hirsutulo; fructu complanato, 6 mm. lato, 4 mm. longo, nitenti, nuculis separatis.

Decumbent shrub without basal burl, 2–4 dm. high, spreading 1–3 m. by rooting branchlets; bark exfoliating in brown shreds, leaving both the branches and the main trunks an unusual light tan-brown in color, not reddish; branchlets pale green, their terminal twigs covered with a fine, quickly deciduous pubescence; mature foliage pale green, the leaves densely bunched on the centrally upright or peripherally assurgent branchlets, the blades extremely variable, usually rounded, rarely lanceolate, or with their tips often truncate or their bases often cuneate, 10–18 mm. long, 6–11 mm. broad, thickish, coriaceous, reticulate above and below, commonly finely serrulate, slightly rough to the touch, the petioles 1 mm. long, stiff, finely pubescent; inflorescences few, the bracts and rachises minutely puberulent, the pedicels glabrous, to 1.5 mm. long; corolla (February–April) white, extremely slender, 4 mm. long, less than 2 mm. broad; ovary hirsutulous; mature fruit (June) flattened, 6 mm. broad, 4 mm. thick, red above, green below, shiny; nutlets separable.

The type, CAS 423,747, collected by the writer on April 18, 1961, is in the herbarium of the California Academy of Sciences in San Francisco. Topotypes collected on April 24, 1961, by Bacigalupi and Heckard are in the Jepson Herbarium of the University of California at Berkeley. The herbarium specimens noted are from the type locality: on a wind-swept minor ridge of the northeast slope of San Bruno Mountain, close to 1100 feet elevation, in northern San Mateo County, California.

This small manzanita forms carpets of pastel-green hue on an outcrop of sandstone at the type locality. The few shrubs there appear to represent the entire range of the species. Their location is about 225 feet below and about 500 paces northeast of the summit of San Bruno Mountain. The location is little more than a mile south of the San Francisco city and county line, less than four miles from the Pacific Ocean, and well inside the Franciscan area that is so often swept by cold summer fogs.

It is desired to give this manzanita the name *Arctostaphylos pacifica* because it seems to represent a relict link between three maritime species of manzanita that occur on California's Pacific littoral from Monterey County northward to Mendocino County. This Pacific manzanita may have affinities with *A. Hookeri* of Monterey County, with an extinct form of *A. franciscana* that once occurred on Mount Davidson in south-central San Francisco, and with a peculiar form of *A. Uva-ursi* that is known only as a single shrub at Point Arena, Mendocino County. The last has leaves that are serrulate, coriaceous and reticulate, in somewhat the manner, if not the color, of the shrub under description.

In fact, however, *A. pacifica* resembles no known living manzanita. Its peculiarly varied, thick, serrulate, pale-hued leaves are more densely bunched on short branchlets than are those of any comparable manzanita. Its sparsely borne white flowers would appear to be the slenderest in the genus as it is known on the Pacific slope. Its shreddy, exfoliating, tan-colored bark is most uncommon in the genus.

Arctostaphylos pacifica is a handsome evergreen in its size-range, which is close to that of *A. franciscana*, *A. Hookeri*, *A. pumila*, and certain shrubby forms of *A. Uva-ursi*. With proper horticultural handling it may develop into the handsomest species of that particular size-group.

The second manzanita under discussion here is, to my knowledge, found only in San Luis Obispo County, California:

Arctostaphylos cruzensis J. B. Roof, spec. nov. Frutex decumbens vel prostratus usque ad 6 dm. altus et 3 m. latus, cortice rubiginoso; ramulis pallide viridulis pilis dense et subtiliter pubescentibus atque sparsis hispidis vestitis; foliis 2-3 cm. longis, 15-17 mm. latis, oblongis acutis interdum obtusisve saepe sessilibus vel raro subsessilibus, auriculato-amplexantibus, saepe dentatis prope basin, plerumque ciliatis; inflorescentia compacta, subtiliter pubescenti, bracteis lanceolatis usque ad 10 mm. longis, margine rubescentibus ciliatis; pedicellis pubescentibus, usque ad 3 mm. longis;

corolla alba infra carnea supra, brevi et lata, 6 mm. longa, 5 mm. lata; ovario tenuiter pubescenti; fructu depresso-globoso, usque ad 7 mm. longo et 10 mm. lato, sparse hirsutulo, nuculis subcoalescentibus.

Prostrate or decumbent shrub without basal burl 3-6 dm. high in center, spreading to 3 m. wide; bark dull dark red; branchlets pale green, with a dense fine pubescence and here and there a solitary hispid hair; leaves pale dull green, oblong, acute or sometimes blunt or rounded, mostly sessile or very nearly so, auriculate and clasping, often toothed along their lower margins, commonly ciliate, 2-3 cm. long, 15-17 mm. wide; inflorescence a small compact head-like cluster, the bracts, rachises and pedicels with a close fine pubescence; bracts to 10 mm. long, lanceolate, with red ciliate margins; pedicels to 3 mm. long; corolla white, topped and suffused with pink or lavender, short, broad, 6 mm. long, 5 mm. wide; ovary finely pubescent; fruit depressed-globose, dull green tinged with dull red, up to 10 mm. wide and 7 mm. thick, covered with fine hirsutulous hairs; fresh nutlets coal-black, almost coalesced and separable with difficulty.

The type, CAS 425,193, collected by the writer on June 1, 1961, is in the herbarium of the California Academy of Sciences in San Francisco. It is from a single plant at the type locality: a shrub draped down exposed sandstone on the eastern cut-bank of State Highway 1, ninety-five paces south of the southeast abutment of the highway bridge over Arroyo de la Cruz Creek in northwestern San Luis Obispo County, California. It is at an elevation of about 50 ft. above sea level and some 500 paces from the sea just south of Point Sierra Nevada. The locality is 3.1 miles north of the road entrance to Piedras Blancas Point lighthouse and 9.5 miles south of Salmon Creek in southwestern Monterey County.

There are apparently no shrubs of this species to the west of State Highway 1, along the narrow strip of land that lies between that highway and the sea. The main body of plants of this species lies east of State Highway 1. The strip of land on which this manzanita commonly occurs is an area that is curious for its native plant distribution. It is a long, often a mesa-like strip that is cut from east to west, from the Santa Lucia Range to the sea, by the flat-bottomed valley of the Arroyo de la Cruz Creek. To the north and south of that valley the land strip under discussion supports a growth of coast live oak (*Quercus agrifolia*) and an attendant chaparral complex. This plant association is not readily in view from the coast highway. Occasional glimpses of it may be had where the eastward terrain is open enough to disclose the Santa Lucia Range. For the most part, however, grassy hills of the Hearst cattle ranges

front the highway, and the complex of chaparral species just beyond those hills has remained hidden from travelers on State Highway 1.

Much of the indicated area was repeatedly visited by Dr. Robert F. Hoover, of the California State Polytechnic College, San Luis Obispo, mostly from early 1948 to 1952. From his studies in the area Dr. Hoover described *Ceanothus maritimus*, a distinctive and attractive shrub that had for too long remained nameless.* After describing that ceanothus, Dr. Hoover wrote: "At the second locality [of *Ceanothus maritimus*] a remarkable association of low-growing shrubs was present, including . . . a strictly prostrate form of *Arctostaphylos Hookeri* Don, and low mound-like clumps of a manzanita which resembles the description of *Arctostaphylos Andersonii* Gray var. *pajaroensis* Adams."

The locations for those manzanitas which Dr. Hoover noted are hidden from public view behind the first grassy hill that lies just south of Arroyo de la Cruz Creek, and east of the coast highway. Behind that hill is an exceptional occurrence of manzanita species. *Arctostaphylos Hookeri* is there, both as "a strictly prostrate form" and as mounded shrubs up to twelve inches in height. *Arctostaphylos tomentosa* is there, too, perhaps in the very colony where it was collected by Katharine Brandegee in 1889 and marked "San Simeon" (University of California Herbarium, Berkeley).

In his article, Dr. Hoover wrote of an old Katharine Brandegee collection of his new *Ceanothus* (which she had noted as being taken near San Simeon): "Recent search in the immediate vicinity of San Simeon has failed to disclose this species. Mrs. Brandegee may have . . . given the nearest town as the locality—a common practice of the nineteenth-century (and of some contemporary) collectors."

I believe that, in order to cross or ford Arroyo de la Cruz Creek, Mrs. Brandegee passed behind the first grassy hill to the south of it, there coming across and collecting both *Ceanothus maritimus* and *Arctostaphylos tomentosa* (Pursh) Lindley, a species that she should have known from the vicinity of Monterey.

The second manzanita mentioned by Dr. Hoover was one

* In "A new *Ceanothus* from San Luis Obispo County, California," *Leaflet West. Bot.* 7:111, 112 (1953).

"which resembles *Arctostaphylos Andersonii* Gray var. *pajaroensis* Adams." Many of the manzanitas in the consociation to which he refers do resemble *A. pajaroensis* Adams. A good many do not. This is because the Arroyo de la Cruz uplands support a wide and freely interchanging mixture of manzanita hybrids and intergrades.

When working toward identification in a swarm of hybrid manzanitas, known parents must first be traced out. If, following success in that process, there remains one consistent form that has no identifiable parents, in the swarm or nearby, it itself may be both a parent and a separate species.

Among the hybrid and intergraded manzanitas under discussion it is easy to recognize typical shrubs of two of the parent species involved in the interchanges, *A. Hookeri* and *A. tomentosa*. Both species have stalked, not sessile leaves.

But there is a third manzanita involved, both as a segregate and as a parent, in the hybrid manzanita swarms that are strung along the inner sides of the first hills away from the sea and Highway 1. It is a low, spreading manzanita having dull-green, sessile leaves. Not having shaggy bark, a basal burl, or an upright habit of growth, it is not *A. tomentosa*. Not having glossy fruits, stalked leaves, or shaggy bark, it is not *A. pajaroensis*. Not having small, glossy, stalked leaves or small, shining fruits, it is not *A. Hookeri*. Not having stalked leaves or densely hispid twigs or smooth, pale fruits, it is not *A. pechoensis* of the San Luis coastal hills farther to the south.

The sessile-leaved plant in the Arroyo de la Cruz manzanita complex is the one which I have described above as *A. cruzensis*. Its type plant, next to State Highway 1, is an excellent example of a species that is commonly found in its pure form in the upland colonies, or all too frequently crossed therein with *A. Hookeri* or *A. tomentosa* to produce individual manzanitas that may resemble the *A. pechoensis* Dudley of southern San Luis Obispo and northern Santa Barbara counties. Or the hybrids may resemble the *A. pajaroensis* Adams of northern Monterey County, or even shrubby *A. imbricata* Eastwood of San Mateo and Alameda counties.

Typical *A. cruzensis* is very closely related to three coastal manzanita species, *A. pechoensis*, *A. pajaroensis*, and *A. imbricata*. It is, however, botanically distinct from any of those species. Though it hybridizes freely with two other species of

manzanita within its range it can hardly, with its sessile leaves, be of hybrid origin. It is the first decumbent, spreading, sessile-leaved manzanita species to be recognized since *A. imbricata* Eastwood was described in 1931.

The main range of *A. cruzensis* lies across the Hearst properties, cattle country, in the frontal foothills of the Santa Lucia Range. In July of 1961, I obtained permission to examine two separate stands of this manzanita, east of State Highway 1. The first lay two miles north of and the second lay one mile south of Arroyo de la Cruz Creek. Range-keepers for the Hearst lands told me that their "sprawling manzanitas" ranged north from Arroyo de la Cruz Creek "nearly to San Carpojo Creek, and south from Arroyo de la Cruz Creek to within three or so miles of the Hearst Castle, a total distance of maybe seven or eight miles." Looking up and down that oak-chaparral belt with binoculars, I saw no reason to disbelieve their estimates.

It is possible that *A. cruzensis* exists, in pure and unhybridized form, on a series of bluffs that lie to the north of the Los Osos Valley Road, between San Luis Obispo and Morro Bay, San Luis Obispo County. However, until flowers and fruits are taken and examined from shrubs of this latter locality, the reference of the manzanitas on this narrow strip of land (which somewhat resembles the strip of manzanita land near Arroyo de la Cruz Creek) to *A. cruzensis* can only be tentative. At the present time we do know that the sprawling manzanitas along the north side bluffs of the Los Osos Valley have three botanical characters—low growth forms, sessile leaves, branchlets without hispid hairs—that link them much more closely to *A. cruzensis* than to *A. pechoensis* Dudley.

In the northern San Luis Obispo County locations, north and south of Arroyo de la Cruz Creek, *A. cruzensis* is associated with low and windswept *Quercus agrifolia*, *Ceanothus maritimus*, *C. thyrsiflorus*, *C. Roweanus*, *A. Hookeri*, and *A. tomentosa*.

The type plant of the Arroyo de la Cruz manzanita is daily fanned by scores of swiftly moving cars. Any interested party can easily observe the type shrub, since it grows directly upon the steeply slanted bank at the side of the highway.

Regional Parks Botanic Garden
Berkeley, California

NEW VARIETIES OF WESTERN PLANTS—IV

BY JOHN THOMAS HOWELL

Pityrogramma triangularis (Kaulf.) Max. var. *semipallida* J. T. Howell, var. nov. Foliorum laminis coriaceis supra viridibus eglandulosis, infra dense glandulosis albido-pallidis, stipite brunnescenti eglanduloso.

This green-faced, silver-backed fern grew on metamorphic rocks (not serpentine) in the canyon of the North Fork of the Feather River, 9 miles northeast of Oroville on the Feather River Highway, elevation about 600 feet, Butte Co., California. The type collection is *J. T. Howell No. 34696* (CAS, type; duplicates, G, US), collected Sept. 20, 1959. Two other specimens, both in Herb. Calif. Acad. Sci., have been seen from the Feather River Canyon in Butte County: 10 miles from Oroville on road (Feather River Highway) to Pulga, *Raven 6620*; Mill Creek road between Feather River Highway and Coyote Gap, *Quick 52-127*. The section of the Feather River Canyon where these collections were made is in the upper part of the Upper Sonoran Zone or in the lower part of the Transition Zone, depending on local physiographic and edaphic conditions.

The two last collections cited above were annotated by K. S. Alt in 1959 as *P. pallida* (Weatherby) Alt & Grant, and indeed they do resemble the silverback fern superficially. In technical characters, however, the three Butte County collections must be aligned with *P. triangularis* sens. strict. since their coriaceous blades are green and glandless above and their stipites are dark brown. In *P. pallida* the upper surface of the blade is white-mealy-glandular and the stipe is purplish-black beneath a white scurfy powder.

Streptanthus amplexicaulis (Wats.) Jeps. var. *barbarae* J. T. Howell, var. nov. A var. *amplexicauli* differt: sepalis ochroleucis vel flavescentibus, siliquis elongatis usque ad 15 cm. longis.

Type: *Dennis Breedlove No. 466* (CAS; duplicates, G, NY, SBC, SBBG, US), collected May 21, 1961, from crevices of a serpentine bluff, 0.7 mile west of Cachuma Saddle on road to Ranger Peak, el. 3400 ft., San Rafael Range, Santa Barbara Co., California. Mr. Breedlove also collected this plant at the same station on Apr. 15, 1961 (CAS, SBC).

The cream-colored or yellowish sepals and the long slender pods set off the present plant as distinct from the typical

plant in which the sepals are purplish and the pods are only about half as long. Moreover, var. *barbarae* has phytogeographic significance in that it is found in a range of Santa Barbara County westerly from the general occurrence of the typical variety which has been known from the San Emigdio Range east and south to the San Bernardino Mts.

ADDITIONS AND SUBTRACTIONS IN THE OREGON WEED FLORA

The weed flora of Oregon is increasing in size yearly. Therefore it is a pleasure to remove the name of one taxon from the list of adventives in the state. *Galium saxatile* L. was reported from the Reed College campus, Portland, Oregon, by Miss Una V. Davies in 1938 (Leaflet West. Bot. 2:12). Examination of her voucher specimen in the Reed College herbarium (Davies 303) by Dr. Keith Goodway and me indicates that her collection is *G. Mollugo* L., a widespread lawnweed in the Pacific Northwest. Since this report appears to be the only mention of *G. saxatile* on the Pacific coast, the species should be removed from the list of western weeds. In North America, *G. saxatile* is reported from Newfoundland (Fernald, Gray's Man. Bot., 8th ed.) where it is probably a ballast-plant; otherwise it seems unrecorded from this continent.

Kickxia elatine (L.) Dum. has only recently been added to the literature on Oregon's flora (Hitchcock et al., Vasc. Pl. Pac. N.W., vol. 4, p. 333). The first record for the state is probably a collection made on the Reed College campus in 1938 (Davies 115) and reported in her unpublished thesis on the campus flora.

Lythrum Salicaria L. is a widespread introduction in the eastern United States, but is recorded in the West only from the vicinity of Puget Sound in Washington (Hitchcock et al., Vasc. Pl. Pac. N.W., vol. 3, p. 463). In August, 1961, a small colony of this attractive plant was noted in a winter-wet depression at the edge of the industrial area on Swan Island, Multnomah County, Oregon. All three style-lengths of this tristylous species were represented in this population, suggesting that further spread by sexual reproduction is possible.—ROBERT ORNDUFF, Duke University, Durham, N.C.

LEAFLETS *of* WESTERN BOTANY

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NOTABLE NEVADA PLANTS*

BY GORDON W. GULLION

Forest Research Center, University of Minnesota, Cloquet

As part of a management-research program investigating the food habits and other aspects of the life history of Gambel Quail (*Lophortyx gambelii*) and Sage Grouse (*Centrocercus urophasianus*) in southern and eastern Nevada, the author had occasion from 1951 to 1955 to make a collection of plant specimens and seeds in order to develop a reference collection for the identification of bird crop and gizzard contents. A number of plants were collected which are apparently unreported from Nevada, while several are rare or otherwise noteworthy. These specimens are now in the Herbarium of the University of California, Berkeley. This paper would have been impossible without the assistance of Dr. Herbert L. Mason, Dr. Helen K. Sharsmith, and the staff at the Herbarium of the University of California, where determinations were made unless specially noted. I am grateful also to the late Dr. S. F. Blake, Section of Plant Introduction, Agricultural Research Service, Beltsville, Maryland, for his suggestion that these records be brought to publication. The specimen numbers cited are from my catalogue.

CUPRESSUS GLABRA Sudworth. Material was collected (No. 529) from two trees growing at Cabin Spring on the north slope of the Virgin Mts., 11 miles south of Mesquite, el. 4500 ft., Clark Co., Nov. 27, 1953. The trees were 15 to 20 feet tall and were growing along a dry creek bed in an association of *Quercus turbinella*, *Pinus monophylla*, *Juniperus osteosperma*, *Garrya flavescens*, and other species. The cypresses may have been transplanted to this site from some other location.

EPHEDRA CUTLERI Peebles. In the Quo Vadis Mine area about 6 miles south of Henderson, el. 2750 ft., Clark Co., May 31, 1952, No. 344. Several plants were growing in the rocks along the side of a sandy wash in a sparse growth of *Larrea tridentata*, *Franseria dumosa*, *Krameria parvifolia*, *Eriogonum fasciculatum*, and others.

AGROPYRON TRITICEUM Gaertn. Elko Municipal Airport, el. 5100 ft., Elko, Elko Co., May 20, 1954, No. 549. This grass was pioneering on disturbed soil.

* This paper is a contribution from a research project supported by Federal Aid in Wildlife Restoration funds, Nevada Project W-8-R, Upland Game Survey.

Leaflets of Western Botany, Vol. IX, No. 15, pp. 225-256, October 15, 1962.

SETARIA LUTESCENS (Weigel) Hubbard. On the north end of the Dead Mts., 15 miles southeast of Searchlight, el. 3200 ft., Clark Co., Oct. 5, 1951, No. 117. A single plant was growing on disturbed soil covering a gallinaceous guzzler.*

CAREX JONESII Bailey. Thomas Canyon Forest Camp, 5 miles south of Lamoille, Lamoille Canyon, Ruby Mts., el. 7500 ft., Elko Co., May 31, 1954, No. 585. A number of these plants were growing in dry soil among *Populus tremuloides*, *Salix* sp., *Prunus virginiana*, and other Basin riparian species.

FRITILLARIA PUDICA (Pursh) Spreng. Holmgren (1942:48) cites one record for this species in northeastern Nevada, from Golliker Pasture in northeastern Elko Co. This species is known to occur in isolated colonies at widespread locations in Elko Co., having been recorded from Rocky Canyon in the Pequop Mts., Taylor Summit in the Independence Range, Dip Creek in the Tuscarora Mts., and in the Pinyon Range southwest of Elko.

NOLINA BIGELOVII (Torr.) Wats. On the south side of the Dead Mts., 12 miles west of Davis Dam, el. 2800 ft., Clark Co., June 7, 1952, No. 364. This is about the lowest elevation for the species in this area but it extends up to 4600 ft., and becomes more abundant at the higher elevations. In this small area it is a prominent element of a High Desert Shrub habitat type (cf. Gullion, 1960), in association with *Coleogyne ramosissima*, *Acacia Greggii*, *Eriogonum fasciculatum*, *Yucca baccata*, *Juniperus osteosperma*, and *Quercus turbinella*.

POLYGONUM FUSIFORME Greene. Pahrump Ranch, Pahrump Valley, el. 2600 ft., Nye Co., Aug. 6, 1953, No. 498. This plant was abundant along an irrigation ditch bank.

AMARANTHUS ALBUS L. Growing as a weed on the Flat Nose Ranch, 13 miles east-southeast of Pioche, el. 5500 ft., Lincoln Co., Sept. 27, 1951, No. 109. All other Nevada records are from the western part of the state.

MIRABILIS CALIFORNICA Gray. In the Quo Vadis area 6 miles south of Henderson, el. 2750 ft., Clark Co., May 31, 1952, No. 340. This plant was growing in a small, rocky, dry gorge, in an association of *Acacia Greggii*, *Eriogonum fasciculatum*, *Prunus fasciculata*, and other plants.

* A gallinaceous guzzler is an artificial water collection device of unique design buried in arid regions for the benefit of desert game animals. It was originally developed by biologists employed by the California Department of Fish and Game, particularly Ben Glading, and is sometimes referred to as "Glading's gallinaceous guzzler."

ABRONIA POGONANTHA Heimerl. Mohave Valley, 10 miles south-southwest of Davis Dam, el. 500 ft., Clark Co., Apr. 5, 1952, No. 198. These plants were abundant on a sandy flat, in association with *Lycium Torreyi*, *Baileya pleniradiata*, and *Schismus barbatus*.

STANLEYA ALBESCENS Jones. Three miles southeast of Las Vegas, el. 1800 ft., Clark Co., Apr. 5, 1951, No. 12. Growing in deep alkaline silt, near thickets of *Prosopis juliflora*.

SISYMBRIUM IRIO L. Growing on disturbed soil at the Spirit Mine on the southwest slope of the Dead Mts., 2 miles west of Davis Dam, el. 3200 ft., Clark Co., Dec. 14, 1951, No. 134. Also at Boulder City, el. 2450 ft., Apr. 20, 1952, No. 212A.

DESCURAINIA PINNATA (Walt.) Britt. subsp. *BRACHYCARPA* (Rich.) Detling. Collected with *Lesquerella Palmeri* and *Eriophyllum Pringlei* in an association of *Larrea tridentata*, *Fraseria dumosa*, *Krameria parviflora*, and *Yucca schidigera*, 10 miles north of Searchlight, el. 2900 ft., Clark Co., Apr. 26, 1952, No. 227A.

OLIGOMERIS LINIFOLIA (Vahl) Macbr. Tidestrom (1925:251, as *Dipetalia*) indicates probable occurrence of this species in Nevada. On May 24, 1952, this was verified when specimens were collected from deep alkaline silt, about 4½ miles southeast of Las Vegas, el. 1720 ft., Clark Co., No. 314. It grew with other annual herbs among bushes of *Atriplex lentiformis* and *A. polycarpa*.

RIBES QUERCETORUM Greene. Grassy Water Spring, about 30 miles north-northwest of Pioche, el. 7100 ft., Lincoln Co., May 5, 1952, No. 267. This plant was growing on a northeast exposure among shrubs of *Artemisia tridentata*, *Purshia tridentata*, and *Amelanchier utahensis*. Haller (Leaflet West. Bot. 9:30, as *Grossularia*) recently reported an occurrence of this gooseberry from southeastern California.

PRUNUS ILICIFOLIA (Nutt.) Walp. Near Rattlesnake Spring in the Dead Mts., 10 miles northwest of Davis Dam, el. 4000 ft., Clark Co., Mar. 3, 1954, No. 536. Several shrubs were growing along the bottom of a rocky wash in association with *Pinus monophylla*, *Quercus turbinella*, and other elements of an Oak Chaparral type.

PRUNUS EMARGINATA (Dougl.) D. Dietr. Although Tidestrom (1925:285), Clokey (1951:118), and Billings (1954:81) list this

species for southern and western Nevada, there seems to be no record of its occurrence in northeastern Nevada (cf. Holmgren, 1942:101). On July 16, 1954, Leonard W. Hoskins, of the Nevada Fish and Game Commission, brought me a specimen of this bitter cherry (*No. 578A*) which he found along Telephone Creek in the Merritt Mt. area, 10 miles east of Mountain City, el. 6450 ft., Elko Co.

DALEA CALIFORNICA Wats. Jepson (1925:558) indicates probable occurrence in Nevada, which is confirmed by a collection made $2\frac{1}{2}$ miles southwest of Davis Dam, el. 1400 ft., Clark Co., May 3, 1952, *No. 252*.

LUPINUS KINGII Wats. In Willow Wash, Gold Butte area, 26 miles southeast of Overton, el. 3200 ft., Clark Co., Apr. 5, 1953, *No. 448*. This plant was growing in deep sand in the bottom of a dry wash in association with *Hymenoclea Salsola*, *Salazaria mexicana*, *Castilleja chromosa*, and *Cryptantha pterocarya*.

LOTUS SUBPINNATUS Lag. On the western slope of the Dead Mts., 15 miles south-southeast of Searchlight, el. 3400 ft., Clark Co., May 3, 1952, *No. 239*. These plants were growing in association with *Larrea tridentata*, *Salazaria mexicana*, and *Franseria dumosa*.

ERODIUM TEXANUM Gray. The occurrence of this species in Nevada is suggested by Jepson (1925:591) and by Kearney and Peebles (1951:486). This was verified on Feb. 18, 1952, when specimens were collected on the alluvial fan $2\frac{1}{2}$ miles southwest of Davis Dam, el. 1400 ft., Clark Co., *No. 140*. Occurring with this species were *Cryptantha nevadensis*, *Eriogonum deflexum*, and *Oenothera multijuga*. Later, on Apr. 25, 1952, *E. texanum* was also found in Eldorado Valley, 7 miles southwest of Boulder City, Clark Co.

KALLSTROEMIA HIRSUTISSIMA Vail. Collected by W. Blair Low (his *No. 8*) near Nelson, el. 3400 ft., Clark Co., in 1950.

DITAXIS NEOMEXICANA (Muell. Arg.) Heller. On the rocky south slope of Eldorado Valley with *Acacia Greggii* and *Franseria dumosa*, el. 2000 ft., Clark Co., Dec. 8, 1951, *No. 124*. This plant was later seen sparingly at widely scattered locations in southern Clark Co.

STILLINGIA LINEARIFOLIA Wats. On the southeast slope of the Dead Mts., 8 miles west-southwest of Davis Dam, el. 2300 ft., Clark Co., May 3, 1952, *No. 250*. It grew in association with

Cassia armata, *Acacia Greggii*, *Eriogonum fasciculatum*, *Lotus rigidus*, and other species of the Desert Wash Shrub type.

EUPHORBIA SUPINA Raf. Collected from a Bermuda grass (*Cynodon dactylon*) lawn in Boulder City, el. 2450 ft., Clark Co., Sept. 1, 1952, No. 396.

EUPHORBIA SERPENS H.B.K. Near Gourd Spring on the east slope of the Mormon Mts., 16 miles northwest of Bunkerville, el. 3300 ft., Clark Co., Sept. 28, 1951, No. 112. Leaves of these plants constituted the major items in the crops of two Gambel Quail collected at the same time.

FOUQUIERIA SPLENDENS Engelm. Ocotillas have been found in at least three locations on the southeast slope of the Dead Mts. in southern Clark Co.: 9 miles west-southwest of Davis Dam, el. 2720 ft.; 8 miles southwest of Davis Dam, el. 1400 ft.; 4 miles south-southwest of Davis Dam, el. 720 ft.

ACER GLABRUM Torr. var. *NEOMEXICANUM* (Greene) Kearney & Peebles. Growing as small trees along Meadow Creek in Eagle Valley, 12 miles east of Pioche, el. 6000 ft., Lincoln Co., May 5, 1952, No. 263.

MENTZELIA NITENS Greene. Growing with *Rafinesquia neomexicana* and *Atrichoseris platyphylla* in coarse granitic soil 8 miles southwest of Davis Dam, el. 920 ft., Clark Co., Apr. 5, 1952, No. 203. Also, on the shore of Lake Mead at the mouth of Dugway Wash, 35 miles south-southwest of Overton, el. 1200 ft., Clark Co., Mar. 5, 1953, No. 436.

VIOLA UTAHENSIS Baker & Clausen. Growing among bushes of *Artemisia tridentata* and *Ribes quercetorum* at Grassy Water Spring about 30 miles north of Pioche, el. 7100 ft., Lincoln Co., May 5, 1952, No. 265. Determination was made by M. S. Baker, who said: "Differs from type in pubescence. Probably of independent origin."

OENOTHERA CARDIOPHYLLA Torr. About 1 mile west of Boulder City on U. S. Highway 93, el. 2500 ft., Clark Co., May 13, 1952, No. 301. Many plants, presumably mostly of this species, were flowering on a south exposure in an association of *Larrea tridentata* and *Franseria dumosa*.

OENOTHERA DENTATA Cav. var. *CAMPESTRIS* (Greene) Jepson. Growing in coarse, decomposed granitic soil on the east slope of the Searchlight Hills, 6 miles east of Searchlight, el. 2600 ft., Clark Co., Mar. 22, 1952, No. 168.

GENTIANA SIMPLEX Gray. Listed by Tidestrom (1925:416) as occurring in the Sierra Nevada in the western part of the state, this plant was also collected from wet soil rich in gypsum, together with *Scirpus Olneyi*, *Juncus Cooperi*, and *Eleocharis rostellata*, near Red Bluff Spring, 13 miles southeast of Overton, el. 1600 ft., Sept. 4, 1953, No. 500.

ASCLEPIAS ENGELMANNIANA Woodson. Rocky stream bed of Garden Spring Creek, south slope of the Clover Mts., 16 miles northeast of Carp, el. 4600 ft., Lincoln Co., June 26, 1954, No. 560. Several of these milkweeds were growing along this stream course together with *Cirsium arizonicum*, *Quercus Gambelii*, *Populus Fremontii*, *Juniperus osteosperma*, *Rhus trilobata*, and others.

ASCLEPIAS SUBVERTICILLATA (Gray) Vail. Growing as a weed together with *Solanum rostratum* and *Polygonum fusiforme* on the Pahrump Ranch, Pahrump Valley, el. 2660 ft., Nye Co., Aug. 6, 1953, No. 499.

LANGLOISIA FLAVIFLORA Davidson. Collected on the sandy flat in the Eldorado Valley, 7 miles southwest of Boulder City, el. 1750 ft., Clark Co., Apr. 26, 1952, No. 216. This species was one of a group of abundant annuals which had responded to the more than normal rainfall (4.82 inches in Boulder City) which fell between October, 1951, and March, 1952, on this desert. This sandy flat is completely barren during dry periods.

CRYPTANTHA CONFERTIFLORA (Greene) Pays. Growing among limestone rocks in a wash on the west slope of Tramp Ridge, Gold Butte area, 21 miles southeast of Overton, el. 3100 ft., Clark Co., Apr. 9, 1953, No. 461. In June, 1952, seeds of this species were found in the crop of a Mourning Dove (*Zenaidura macroura*) collected at the mouth of Hackberry Wash on the south slope of the Mormon Mts., 25 miles north of Overton, Lincoln Co.

CRYPTANTHA HUMILIS (Gray) Pays. Reported from northeastern Nevada by Holmgren (1942:150), this plant was also collected with *Astragalus Newberryi* in association with *Artemisia tridentata*, *Purshia tridentata*, *Pinus monophylla*, and *Juniperus osteosperma* on Delamar Pass, 10 miles west of Caliente, el. 6450 ft., Lincoln Co., May 4, 1952, No. 260.

PHYLA NODIFLORA (L.) Greene var. *ROSEA* (D. Don) Moldenke. Boulder City, el. 2450 ft., Clark Co., Sept. 1, 1952, No. 397.

HYPTIS EMORYI Torr. Both Tidestrom (1925:482) and Jepson (1925:879) correctly indicate probable occurrence of this species in Nevada. The shrub occurs commonly in desert washes on the south slopes of the Dead Mts. west of Davis Dam, Clark Co.: 8 miles southwest of Davis Dam, el. 600 ft., Apr. 7, 1952, No. 208.

PHYSALIS LONGIFOLIA Nutt. On fallow land at the Flat Nose Ranch, 13 miles east-southeast of Pioche, el. 5500 ft., Lincoln Co., Sept. 27, 1951, No. 104.

SOLANUM ROSTRATUM Dunal. Pahrump Ranch, Pahrump Valley, el. 2600 ft., Nye Co., Aug. 6, 1953, No. 497. This was one of a number of weeds, including *Asclepias subverticillata* and *Polygonum fusiforme*, growing along an irrigation ditch serving a nearby cottonfield.

NICOTIANA GLAUCA Graham. This grows on the west shore of Lake Mead at a sewage outlet at Boulder Beach, el. 1360 ft., Clark Co.

PENSTEMON ABIETINUS Pennell. North-facing slope above Horse Spring, Mormon Mts., 12 miles south-southeast of Carp, el. about 6000 ft., Lincoln Co., June 28, 1954, No. 567. This was growing in some abundance among the ground cover plants under *Pinus ponderosa*, *P. monophylla*, *Cercocarpus ledifolius*, and *C. intricatus*.

PLANTAGO PURSHII Roem. & Schult. The probable Nevada occurrence indicated by Tidestrom (1925:511) and Kearney and Peebles (1951:804) was confirmed by collections made in Clark Co., 10 miles northeast of Searchlight, el. 3300 ft., June 4, 1952, No. 353; 9 miles southwest of Searchlight, el. 3850 ft., June 6, 1952, No. 357.

CUCURBITA PALMATA Wats. This palmate-leaved gourd has been found at several sites on the south and east slopes of the Dead Mts., in southern Clark Co., as at Grapevine, Dripping, Sacatone, Hyco, and Granite springs, and on the Pahrump Ranch, Pahrump Valley, southern Nye Co.

MARAH FABACEUS (Naud.) Greene. Occurrence of this plant in extreme southern Nevada is suggested by Tidestrom (1925:519) and was confirmed by a collection at Pipe Spring, 6 miles northwest of Davis Dam, el. 2500 ft., Clark Co., Mar. 3, 1954, No. 534.

ARTEMISIA CANA Pursh. Holmgren (1942:190) lists this species

for northeastern Nevada, and it also occurs in higher mountain basins throughout Eureka, Lander, Lincoln, Nye, and White Pine counties. This species was especially common in the Hamilton area, el. 8160 ft., White Pine Co., Sept. 12, 1953, No. 506. Here it was collected with *Petrophytum caespitosum*, *Lygodesmia spinosa*, and *Chrysothamnus viscidiflorus* var. *pumilus*.

BAILEYA PAUCIRADIATA Harv. & Gray. Growing with *Gutierrezia Sarothrae*, *Croton californicus*, and *Euphorbia Parryi* on the shoulder of the highway across Mormon Mesa, 14 miles north of Overton, el. 2100 ft., Clark Co., Nov. 2, 1952, No. 419.

BIDENS CERNUA L. Listed for northeastern Nevada by Holmgren (1942:185), this plant was collected with *Scirpus americanus*, *Rumex persicarioides*, *Epilobium brevistylum*, *Allocarya Cusickii*, and *Chrysothamnus nauseosus* var. *consimilis*, at Mud Spring, 16 miles southwest of Hawthorne, el. 6550 ft., Mineral Co., Sept. 28, 1953, No. 515.

CENTAUREA SOLSTITIALIS L. The probable occurrence of this Old World species in Nevada was indicated by S. F. Blake (in Tidestrom 1925:620). This was verified on June 28, 1952, when specimens were collected on the shoulder of U. S. Highway 91 about 3 miles southwest of Crystal, el. 2200 ft., Clark Co., No. 375.

CIRSIIUM SCOPULORUM (Greene) Cockerell. S. F. Blake (in Tidestrom 1925:618) questions whether or not this species occurs in Nevada. On September 13, 1953, specimens were collected on the northwest slopes of Treasure Hill in the Hamilton area, el. 8680 ft., White Pine Co., No. 513. The plant was growing on the edge of an *Abies concolor* forest.

CIRSIIUM ARIZONICUM (Gray) Petrak. Along Garden Spring Creek on the south slope of the Clover Mts., el. 4600 ft., Lincoln Co., No. 559. A number of plants of this species were growing among the boulders on the margin of the stream bed with *Asclepias Engelmanniana* (reported above).

DYSSODIA PENTACHAETA (DC.) Robins. Coyote Valley, 20 miles northwest of Glendale Junction, el. 2300 ft., Clark Co., May 8, 1952, No. 285. This was growing with other annuals in a sandy wash in association with *Acacia Greggii*.

ERIGERON BONARIENSIS L. Las Vegas Valley east of Las Vegas, el. 1800 ft., Clark Co., Oct. 3, 1951, No. 113.

PEREZIA WRIGHTII Gray. Cedar Basin, Gold Butte area, 24

miles southeast of Overton, el. 4200 ft., Clark Co., Nov. 28, 1953, No. 531. This plant was growing in decomposed granitic soil on burned-over ground in an area formerly occupied by a pygmy forest of *Pinus monophylla* and *Juniperus osteosperma*.

TETRADYMIA STENOLEPIS Greene. Dead Mts., 9 miles west-southwest of Davis Dam, el. 2680 ft., Clark Co., No. 384. This plant was in an association of *Fouquieria splendens*, *Acacia Greggii*, *Cassia armata*, *Opuntia ramosissima*, and *Lotus rigidus*.

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FIVE DAYS TO RENO: A BOTANICAL MOTORLOGUE

BY JOHN THOMAS HOWELL

Nowadays, when it is possible to traverse great distances in a short time by automobile over our system of burgeoning free-ways, one can be botanizing on the Nevada slopes of the Sierra Nevada near Reno by lunch time after an early morning breakfast in San Francisco. Although these Nevada slopes were my objective on a week's field trip in June, 1962, I decided to approach them in a leisurely round-about manner befitting a botanist. So, instead of freewaying over Donner Summit and down to the sagebrush slopes beyond, I meandered through the Feather River country and became almost immobile on the flower-splattered flats of Sierra Valley. (Why pass a desirable plant just to go some place where something less desirable might be found?)

The five-hour ride to Reno stretched into five flowery days, and since each day had its own particular floral pleasures, I shall divulge these delights day by day.

THE FIRST DAY

On the afternoon of June 14, 1955, Lewis S. Rose and I spent a couple of hours botanizing among the MacNab cypresses that grow on the serpentine slopes at Magalia, Butte County. Ever after I wanted to return to this arboreal island; and now in 1962, since there was no hurry to reach Reno, I decided to detour through the ever-fascinating Feather River country and revisit Magalia. There on the canyon rim of the West Branch of the Feather River, where yellow and digger pines are associated with the cypresses, I spent the afternoon of June 15 and the morning of June 16, finding about 140 different kinds of plants. Many are noteworthy (in fact a *florula Magalium* would seem indicated), but I shall remark chiefly on some weeds.

TWO PINKS. On the open rocky serpentine slopes grew a tufted small-flowered pink with rosy-red petals, *Dianthus Armeria* L., the Deptford pink (*Howell 37511*). Although this European plant has been known heretofore from Oregon and Washington, this is apparently the first record of its occurrence in California. Nearby in clay soil overlying the serpentine grew another pink, the childing pink, *D. prolifer* L. (*No. 37552*). Whereas these are the first plants of the Deptford pink I have seen in California, the childing pink is known occasionally in the northern Sierra Nevada foothills from Butte County south to Placer County.

BERRY BRAMBLES. A stone's throw distant from the two pinks grew a prickly tangle of berry canes—five different kinds, more in one place than I had ever seen before. Besides the native blackberry, *Rubus ursinus* var. *glabratus* Presl (*No. 37455*), and the native raspberry, *R. leucodermis* Dougl. (*No. 37454*), there were three introduced species that were rampantly naturalized. Two of these are European and are already too well known in California hill country: *R. laciniatus* Willd. (*No. 37452*) and *R. procerus* P. J. Muell. (*No. 37453*). The third, however, has apparently not been reported heretofore in California: *R. pensilvanicus* Poir., a native of eastern North America (*No. 37451*). In 1948, this same blackberry was collected by Henry M. Pollard near Orleans, Humboldt County, California, a collection (CAS) determined by L. H. Bailey. The Pennsylvania blackberry may be recognized in California by the non-glandular velvety pubes-

cence on the 5-foliolate leaves of the primocanes. If glands are interspersed among the soft hairs of the leaves and stems, the plant so marked is *R. allegheniensis* Porter. I did not see the Allegheny blackberry at Magalia but I found it in September, 1961, in Indian Valley, Plumas County (No. 36839).

SIERRAN AGRIMONY. *Agrimonia gryposepala* Wallr. is a rare plant in California and in the Sierra Nevada has only been known from Plumas County and adjacent Shasta County (Jepson Fl. Calif. 2:214). The following collections (CAS) extend its known Sierran range: Magalia, Butte County, *Chester Dudley in 1940, Howell 37526*; Big Bar Mt., Butte County, *C. R. Quick 40-96*; Dry Creek, 7 miles southwest of Grass Valley, Nevada County, *G. H. True 47*; 2 miles east of Cool on road to Greenwood, Eldorado County, *T. C. Fuller 7088*.

THE SECOND DAY

What plants shall I tell about from that wonderful second day, as I went from Magalia to the Feather River Canyon (North Fork) by way of Yankee Hill and on to Greenville, Plumas County? Perhaps the associates of *Lewisia Cantelovii* at "Lewisia Rock"; or the caricetum among the azaleas above Belden; or *l'affaire de femme* near Yankee Hill where I risked being shot as a poacher! But no; instead I shall write about some more weeds and a fern from Nelson Bar; they seem most important at the moment.

PENTZ ROAD WEEDS. When at last the good collecting on the Magalia serpentine came to an end, I started out along Pentz Road for Yankee Hill and the Feather River North Fork. Scarcely had I gone 2 miles when a roadside patch of rosy yarrow stopped me. It was *Achillea Millefolium* L., an Old World plant about which Munz and Keck (1959, p. 1229) have written, "to be expected" in California; and the pink-flowered form that I found was var. *rosea* Rand & Redf. (*Howell 37581*).

One good weed deserves another, and there it was a few feet from the yarrow—the beautiful, gray-leaved, yellow-flowered Dalmatian toadflax, *Linaria dalmatica* (L.) Miller. Beneath all its beauty lurks a pernicious weediness, so wicked that the California Department of Agriculture regards the plant as "noxious." Since 1954 when I reported its occurrence in San Diego and Ventura counties (Leaff. West. Bot. 7:152), it has been found in

San Mateo, Modoc, Siskiyou, and Alpine counties. And now it is known from Butte County.

A MEDITERRANEAN HEDGE-PARSLEY. In the canyon of the Feather River West Branch southwest of Nelson Bar I found a ruddy-flowered hedge-parsley that has turned out to be *Torilis heterophylla* Guss., an Old World species not heretofore reported from North America (Howell 37593). The plant has been found occasionally in northern California and southern Oregon, but heretofore it has been called either *T. japonica* or *T. arvensis*. Besides the Nelson Bar collection, I have seen the following from California and Oregon (CAS); Jenner, Sonoma County, Leary & Sherfey in 1961; Berry's Mt., Humboldt County, M. S. Baker 11486 in 1946; near Scottsberg, Douglas County, Oregon, M. E. Peck 20257 in 1939. *Torilis heterophylla* is closely related to *T. arvensis* (Huds.) Link, but it may be readily distinguished from that plant (which also grows in coastal California and Oregon) by the 2- or 3-rayed umbels and by the usually dimorphic carpels of the fruit (only one mericarp in each pair developing elongate glochidiate appendages).

The identification of *T. heterophylla* as a component of our Pacific coast flora disclosed the frequent misapplication of the name *T. japonica* (*T. Anthriscus*) in North America. Whereas most floras of the central, southern, and eastern United States refer the loosely branching hedge-parsley to *T. japonica* (or *T. Anthriscus*), most of the plants examined (CAS, UC) belong to *T. arvensis*. *Torilis japonica* (Houtt.) DC. appears to be a rare plant in the United States, specimens having been examined only from Illinois, Ohio, and New Jersey. *Torilis arvensis* (Huds.) Link is much more common and has been seen not only from California (Santa Cruz and Humboldt counties) and Oregon (Douglas and Coos counties) but also from Arkansas, Illinois, Indiana, Kansas, Ohio, Oklahoma, Tennessee,* Texas, and West Virginia. In *T. japonica* the involucrel bracts are numerous and the styles are glabrous; in *T. arvensis* and *T. heterophylla*, the involucre is reduced to one bract or is lacking and the styles are more or less bristly-hairy, at least near the base.

CRUCIANELLA, A CALIFORNIAN BY NOW! Near Nelson Bar the attractive Mediterranean weed, *Crucianella angustifolia* L., was found (No. 37612). It is not too conspicuous as it grows among

* The Tennessee specimen, C. R. Bell 1545 (UC), on which is based the chromosome count $n=6$, is labeled *T. japonica* but, since the plant lacks an involucre, it is actually *T. arvensis*.

drying grasses, so although it is now over eighteen years since it was first detected in California (cf. Leaf. West. Bot. 4:64), I know of it from only five collections. These are from Shasta, Butte, and Yuba counties, a range wide enough to admit the plant to the California flora (though it was not accorded recognition by Munz and Keck in 1959). By now, I regard *Crucianella* as a Californian, for better or for worse!

THE SEMIPALLID SILVER-BACK. The serpentine slopes at Nelson Bar on the West Branch of the Feather River support a number of noteworthy plants, but at this time I shall report the occurrence of only one: *Pityrogramma triangularis* (Kaulf.) Maxon var. *semipallida* J. T. Howell. This variety was described only last spring (Leaf. West. Bot. 9:223), based on collections from the Feather River Canyon. So far, this silver-back fern has been found only in Butte County. The present collection is the first one definitely known from serpentine.

THE THIRD DAY

On the third day as I went from Greenville to Portola, I made a pleasant detour to Butterfly Valley near Keddie, not so much to see the California pitcher-plants (*Darlingtonia californica*) which grow there, as to collect such *glumaeflorae* as I might find associated with those remarkable plants. I would probably write about this meadow and its plants except that everything for the day is overshadowed by what I found at Portola.

THE LENTIL LOCO. The botanical high-point of the Reno expedition was reached at 4:30 p.m. on June 17, when I found *Astragalus lentiformis* Gray at Portola, Plumas County (No. 37702). Here was a plant apparently known only from two collections, the original made by Lemmon in Red Clover Valley, Plumas County, in 1875, and the second made by Alice Eastwood at Portola in 1918 (No. 7021). So scarce is the plant that Jepson (Fl. Calif. 2:373) was moved to comment, ". . . this is one of the rarest of California Astragali," while Barneby in Munz and Keck (p. 874) merely remarked, "rare."*

Why this plant is so uncommon remains a mystery, because I found it in an ordinary habitat on an ordinary hillside. There,

* "The rediscovery of *Astragalus lentiformis* must have been a great thrill, and it enabled me to confirm one important critical character which the older collections do not show clearly. This is one of several cases of a very rare and local *Astragalus* occurring in common territory with two other members of the genus and partaking of some characters of each—in this, the habit of *A. Pulsiferae* and the pod of *A. Lemmoni*. Its origin as a hybrid is rather plausible and might help explain its very limited dispersal."—Letter from R. C. Barneby, Aug. 24, 1962.

near the southern outskirts of the town of Portola, at an elevation of 4800 feet, it was associated with such common and widespread shrubs as antelope brush (*Purshia tridentata*) and sagebrush (*Artemisia tridentata*) in an open grove of Jeffrey pine (*Pinus jeffreyi*), the sort of habitat repeated on a thousand hillsides in this part of the Sierra Nevada. The plant was rare (I saw only three individuals), the slender, leafy, subprostrate stems spreading out from the top of a thick root-crown. The small flowers were pale ivory-yellow that became a little more yellow in age. The tiny lentil-like pods remained attached to the fruiting calyx when they fell from the plant.

A NOTEWORTHY ASSOCIATE OF THE LENTIL LOCO. Many herbaceous perennials grew with the lentil loco—*Phacelia*, *Lupinus*, *Hydrophyllum*, *Lathyrus*, *Crepis*, *Lomatium*, *Poa*, *Melica*, *Carex*—but I shall report on only one in particular, *Haplopappus carthamoides* (Hook.) Gray var. *Cusickii* Gray. Munz and Keck (p. 1175) report the California occurrence of this south to Shasta and Lassen counties. My discovery (No. 37716) extends the known range southward almost across Plumas County and gives us the first record I have seen for the Sierra Nevada.

THE FOURTH DAY

The fourth day on my way to Reno, June 18, began and ended in Portola and was devoted to the wonderful wild flower patches along the western edge of Sierra Valley on the road from Beckwourth, Plumas County, to Sierraville, Sierra County, a distance of about twenty miles. Over one hundred different collections were made from the various localized plant societies—from open places among bushes of sagebrush (*Artemisia tridentata*); from clayey flats of more sterile soil where *Artemisia arbuscula* grew; from low ground where vernal pools had stood; from marshy spots, merely wet or still under water. Everywhere the plants were budding, flowering, or fruiting—happy, it would seem, that the three-year drought was over. I could scarcely believe that this flowery valley was the same that I had visited in September, 1961, when everything was deadly dry and where the only (but truly exceptional) collecting was had on the broad dry bed of the Middle Fork of the Feather River. Among all the plants I saw on June 18 the most interesting is a *Potentilla* in the subgenus *Ivesia* that I believe to be new.

A NEW SIERRAN POTENTILLA. Along the road from Beckwourth to Sierraville I collected two potentillas with flowers so dissimilar that I was sure I had found two different species. Near Beckwourth the flowers were small and saucer-shaped with the short bright yellow petals exceeded by the stellately spreading sepals (No. 37796), while near Sattley the flowers were larger and cup-shaped with the erect sepals surpassed by broad white petals (No. 37826). On referring to recent treatments of California potentillas, I find that these Sierra Valley plants are treated as one species either under the name *Potentilla Pickeringii* (Jepson Manual 491,—1925; Jepson Fl. Calif. 2:192—1936) or *Ivesia sericoleuca* (Keck in Lloydia 1:135,—1938; Abrams Fl. Pac. States 2:425,—1944; Munz & Keck Calif. Fl. 767,—1959). Since the first of these names may be properly restricted to a rare endemic of the Klamath Mountains of northwestern California, and since the second of these names was particularly applied by Rydberg (Mem. Dept. Bot. Columbia Univ. 2:144,—1898, as *Horkelia*) to the flower with white petals "much exceeding the sepals," it is evident that the yellow-flowered plant is without a name. Because of its open shallow star-like flowers, I shall call the plant

Potentilla aperta J. T. Howell, spec. nov. *Horkelia Pickeringii* Rydb. in part, Mem. Bot. Dept. Columbia Univ. 2:145, pl. 86 (1898); *Ivesia Pickeringii* Rydb. in part, N. Amer. Fl. 22:284 (1908); *Potentilla Pickeringii* Jepson in part, Fl. Calif. 2:192 (1936); not *Ivesia Pickeringii* Torr. ex Gray. *Ivesia sericoleuca* Keck in part, Lloydia 1:135 (1938); not *Ivesia sericoleuca* (Rydb.) Rydb. Herba perennis pilis tomentellis sericeis eglandulosis pallida, caulibus foliosis, ascenduntibus vel erectis, 1.5—4 dm. longis; foliis elongatis, 1—2 dm. longis, pinnatis, foliolis numerosis confertis imbricatis, integris vel plerumque in 2—4 segmenta oblonga ellipicave obtusa acutave 3—20 mm. longa divis; cyma multiramosa multiflora floribus in glomerulos densos subcapitados congestis; hypanthio ad anthesin aperto meniscoideo vel late turbinato-hemisphaerico, 1.5—2 mm. alto, circa 4 mm. lato, intus glabro; receptaculo hirsuto; bracteolis 1.5—2 mm. longis; sepalis triangularibus 3—4 mm. longis, 1.5—2 mm. latis, acuminatis, glabris intus, pallide flavido-viridibus ad anthesin; petalis luteis, anguste vel late spathulatis, fere sepalis brevioribus, 3—3.5 mm. longis, 1—2 mm. latis, gradatim in unguem angustatis, apice obtusis vel subtruncatis; staminibus 15—20, filamentis filiformibus flavis glabris, antheris circa 0.5 mm. longis, non apiculatis; stylis circa 4, 2 mm. longis, minute glandulosis basi; achaeniis oblique pyriformibus, 2 mm. longis, paulum reticulatis nitentibus.

Type: Beckwourth ("Beckwith"), elevation about 4900 feet, Plumas County, California, Heller & Kennedy 8882, July 18, 1907 (CAS No. 186,253). Other collections, all from Sierra Valley: 0.5 mile east of Beckwourth, Keck

& Gustafsson 4901 (CAS, UC); about 2 miles south of Beckwourth, Howell 37796 (CAS); Newman Point, Plumas County, Crum 1937 (UC); Loyalton, Sierra County, Eastwood 7869, 7869a (CAS). The collection of Keck and Gustafsson cited here is undoubtedly the basis for the chromosome count, $n=14$, given as from "Gustafsson, ms." by Munz and Keck (Calif. Fl. p. 767).

Although *P. aperta* is probably most closely related to *P. sericoleuca* (Rydb.) J. T. Howell, which it resembles closely in habit and pubescence, it is perhaps just as near *P. Kingii* (Wats.) Greene which has open flowers with a saucer-shaped hypanthium. *Potentilla Kingii*, a plant of the Great Basin ranging widely from the eastern borders of California across Nevada into Utah, has thinly pubescent or glabrous herbage, a more open inflorescence, and white petals.

THE FIFTH DAY

Although I had resolved to get on to Reno speedily on June 19, the flowers in the northern part of Sierra Valley dashed my resolution and the entire morning was devoted to the 15 miles between Beckwourth and Beckwourth Pass. Here are a few of the plants that more than once slowed me to a standstill.

THE GARDEN AT THE BUTTES. About 4 miles east of Beckwourth are the conspicuous rocky hills called The Buttes and as I skirted their lower slopes on the road to Reno I was flagged to a stop by brilliant yellow masses of *Castilleja Applegatei* (No. 37852) growing around bushes of sagebrush. Several annual herbs were in the loose sandy soil between the bushes—*Cryptantha circumscissa* (No. 37851), *Phacelia linearis* (No. 37845), and, most interesting of all, a small-flowered *Nama* (No. 37850). The corolla of the *Nama* varies from 5 to 8 mm. long, so it is a bit too large to be *N. densum* and a bit too small to be *N. aretioides*. It may possibly be *N. aretioides* forma *californicum* Brand which was based on a Sierra Valley plant collected by J. G. Lemmon in which the corollas are 9 to 10 mm. long. The little *Nama* from The Buttes will require further study.

Among the several perennial grasses in the place, the Indian ricegrass (*Oryzopsis hymenoides*, No. 37839) and Elmer's needlegrass (*Stipa Elmeri*, No. 37840) were not uncommon. Remembering that *Oryzopsis* and *Stipa* frequently cross when growing together, I looked about for a hybrid and one was located in a few minutes. The hybrid was a handsome robust bunchgrass with culms about 1 m. tall and with an openly branched inflorescence. When this hybrid was described by B. L. Johnson in

1945 (Amer. Journ. Bot. 32:605), he stated that he had seen only one specimen, *Yates 6276*, from Mono County. Only one plant of the hybrid was detected at The Buttes in Plumas County.

AN AMMOPHILOUS TRIO. I had traveled on about 1.8 miles when some shallow drifts of sand among the sagebrush bushes called for attention. And what a lucky stop it was, because among the dozen or so things collected, three are rather uncommon, at least in the Sierra Nevada: *Monolepis spathulata* Gray, *Loeflingia squarrosa* Nutt., and *Spergularia atosperma* R. P. Rossbach. Although each of these species has been known in this part of the Sierra Nevada from collections made by J. G. Lemmon nearly 90 years ago, the plants have been rarely collected here and seem entirely noteworthy.

Monolepis spathulata is a charming little chenopod but one that is known to me from less than a dozen collections in the entire Sierra Nevada. My collection brings to three the number of records from Sierra Valley: Sierra County, collected by Lemmon, acc. Bot. Calif. 2:49 (1880); Loyalton, Sierra County, *Eastwood 7808*; and my present collection in Plumas County, *No. 37871*.

The collection of *Loeflingia squarrosa* (*No. 37872*) gives us a definite montane record for a plant Munz and Keck (Calif. Fl. p. 285) would restrict to localities "below 2000 ft.". Northern flats of Sierra Valley where I made my collection have an altitude of about 4900 feet. J. G. Lemmon made his collection in Sierra County (Syn. Fl. 1:255,—1897).

Heretofore *Spergularia atosperma* has been known from the Sierra Nevada from one, or possibly two, collections that were cited by R. P. Rossbach when she described the species (*Rhoda* 42:80, 82,—1940),—the first from Sierra Valley, Sierra Co., made by Lemmon in 1874, the second from "south of Carson City, Ormsby Co.," Nevada, made by M. E. Jones in 1897. I have made two collections in Sierra Valley, Plumas County: the present one, *No. 37866*, and another made in 1951, 3 miles east of Beckwourth, *No. 28234A*. On the present Reno expedition, I made a second collection of the black-seeded sand-spurrey, just about twenty-four hours after the first: on dry sagebrush-covered slopes at Steamboat Hot Springs (Reno Hot Springs), Washoe County, Nevada, *No. 38006*. This may represent a new Nevada station for a rather rare plant.

ON TO RENO. After entering Nevada on my round-about journey to Reno, I made few stops before reaching the city. One was at an alkali flat at the northern base of Peavine Mt., 14 miles north of Reno. Here, amid a meadow-like growth of grasses, sedges, and rushes was one of the prettiest species of *Astragalus* I have ever seen, *A. dasyglottis* Fisch., with head-like clusters of violet-blue flowers (No. 37895). This is the plant that has formerly gone under the names *A. agrestis* Dougl. (Barneby, Contrib. toward a Fl. of Nev. No. 38, p. 78,—1956) or *A. goniatus* Nutt. (Tidestrom, Fl. Utah and Nevada, p. 326,—1925), but Barneby (Leaflet West. Bot. 9:49–51) has shown that the plant is not restricted to North America and that the Old World name given here is the oldest. Interestingly enough the plant had been collected at exactly the same station twenty years earlier by Ripley and Barneby, their No. 4508 (CAS). Also in the Academy herbarium is *P. B. Kennedy* 2064 from Lemmon Valley in the same general region, dated June 3, 1913. Associated with the attractive loco were two interesting alkali grasses, *Puccinellia distans* (L.) Parl. (No. 37892) and *P. airoides* (Nutt.) Wats. (No. 37893). And nearby was a beautiful mat of the silver-leaved *Cressa minima* Heller (No. 37894), almost at the place on the “north side of Peavine Mountain” where the type collection was made.

A little farther on, the roadside banks were covered with the marvelously hairy annual lupine, *Lupinus malacophyllus* Greene (No. 38102). The flowers are pale, whitish or lavender except for the violet-tipped keel, not “bluish purple” as given by Eggleston in the Flora of Utah and Nevada (p. 291). Also Eggleston has turned the calyx upside down—the lower lip is green and herbaceous and the upper lip is scarious, just as Greene described them from the original material C. F. Sonne sent him in 1888 from Verdi (Pittonia 1:215). The wing-petals are connate at their outer edge and as the legume matures they form a conspicuous white loop between the lower calyx-lip and the fruit. I do not recall seeing anything like this distinctive feature in any Californian lupine.

And just as I came over the southeastern foothills of Peavine Mountain into the northern outskirts of Reno, I beheld a sight to thrill the heart of anyone who loves *Eriogonum*—an entire slope of dusky yellowish-white, *Eriogonum collinum* Stokes in its type locality (No. 38100). What a welcome to Reno! Why had I delayed my arrival for so many days!

WHEN A BOTANIST GAMBOLS IN RENO

BY JOHN THOMAS HOWELL

U. S. Highway 395, as it extends northward from Bishop, California, through Reno, Nevada, to Susanville, California, offers a convenient, and in most parts a natural, eastern boundary for the Sierra Nevada, and, in my floristic study of the range, I have adopted that line as my eastern limit. Since the Nevada segment of the Sierra as delimited in this way has been one of the parts least known to me, I have recently made two excursions along the eastern boundary in an attempt to bring the Nevada front of the mountains into floristic focus, the first in September, 1961, the second in June, 1962. Because I am so impressed with the increasingly important role introduced plants are playing in our flora, I made every effort to collect weedy plants which are particularly numerous in and about Reno. Several of these (at least one is indigenous) appear to be noteworthy. All are from Washoe County unless otherwise stated.

BROMUS HAENKEANUS (Presl) Kunth. Garden and street weed in Reno, No. 37032, 37912. This South American brome has been recorded for Nevada by Raven (Leaflet West. Bot. 8:153,—1957) from Churchill, Nye, and Washoe counties.

SETARIA GLAUCA (L.) Beauv. Northern foothills of Peavine Mt. along Highway 395, No. 37017. Although this grass is listed with an overall generalized distribution by Chase (in Tidestrom, 1925, p. 69, as *Chaetochloa lutescens*), it is not included by Swallen (1940) in his "Gramineae of Nevada," and there is no dot for the State of Nevada on the distributional map of the species as given by Chase in 1951 (p. 719, as *S. lutescens*). Where I found *S. glauca*, it was growing with *S. viridis* (L.) Beauv. (No. 36995) which was much more common and which has been reported from many parts of Nevada.

HORDEUM GLAUCUM Steud. *H. Stebbinsii* Covas. Street weed, Reno, No. 37913A; waste ground, 3 miles south of Reno, No. 37933. A collection from Clark County was cited by Covas when he described *H. Stebbinsii* (Madroño 10:19,—1949).

The following grains, not listed by Chase (in Tidestrom, 1925) nor by Swallen (1940), were found growing spontaneously as conspicuous roadside plants:

HORDEUM DISTICHON L. Two-row Barley. Near Reno, No. 38086.

HORDEUM VULGARE L. Barley. Northern foothills of Peavine Mt., No. 37004; near Reno, No. 38084.

SECALE CEREALE L. Rye. Near Reno, No. 38087.

TRITICUM AESTIVUM L. Wheat. Near Reno, No. 38085.

Neither of the two following elms, which were found growing weedily, are listed by Tidestrom (1925, p. 140); and only the genus *Celtis* is admitted to the "Ulmaceae of Nevada" by Fosberg (1940).

ULMUS PROCERA Salisb. English Elm. Root-sprouting tree weed, Reno, No. 37907.

ULMUS PUMILA L. Siberian Elm. Seedling from waste ground, 3 miles south of Reno, No. 37929. The broad-based often subcordate stipules have been used to identify this specimen which might be confused with *U. parvifolia* Jacq., the Chinese elm (cf. Rehder, Man. Cult. Shrubs ed. 2, p. 181,—1940).

CHENOPODIUM INCOGNITUM Wahl. Although neither Wahl (Bartonia 27:27,—1954) nor C. F. Reed (1956, p. 28, 29) cite collections from Nevada, the following may be listed here: northern foothills of Peavine Mt., No. 37026, 37027; near Mt. Rose, Howell 14031 (det. Wahl, 1955); Reno, near the university, Eastwood 14776 (det. Wahl, 1955, as "*probably C. incognitum*"); Buckskin Peak region, about 10 miles north of Canyon Creek Summit, Santa Rosa Range, Humboldt County, Train 495 (det. Wahl, 1955, as "*good incognitum*"). This species, though often growing weedily, is indigenous.

CHENOPODIUM STRICTUM Roth var. *GLAUCOPHYLLUM* (Aellen) Wahl. Apparently a plant new to Nevada: northern foothills of Peavine Mt., No. 37025; Beatty, Nye Co., Raven 6273 (det. Wahl, 1955).

STELLARIA GRAMINEA L. A lawn weed without flowers or fruits that resembles this Old World starwort was found in Reno near the university in September, 1961, No. 37033. No flowers were seen when the lawn was revisited in June, 1962.

EREMOCARPUS SETIGERUS (Hook.) Benth. The turkey mullein, so common on the dry hills and plains of California, has not been reported from Nevada. I found it in disturbed soil along the Mt. Rose Highway near Reno Hot Springs (No. 37035, 38022) where it appears to be adventive rather than indigenous.

EUPHORBIA SUPINA Raf. This widespread weedy American spurge occurred as a street weed in Reno near the university

(No. 37904). The distribution of the plant as given by Norton (in Tidestrom, p. 345, under *Chamaesyce maculata*) excludes Nevada, as also do the map and distributional data given by L. C. Wheeler (Rhodora 43:226, 260,—1941).

CARDUUS NUTANS L. Edge of pasture, 2 miles north of Steamboat Hot Springs, No. 37974. This Old World species is widespread in the western United States, but apparently it is not common. The only other Nevada collection I have seen I reported in 1959 from Esmeralda County (Leaf. West. Bot. 9:19).

CENTAUREA DIFFUSA Lamk. Along Highway 395, 2 miles north of Steamboat Hot Springs, No. 37973. Also known from Douglas County: in alfalfa, Louis Van Fleet Ranch, 1 mile south of Centerville, P. C. Martinelli in 1961 (CAS, Calif. Dept. Agr. Herb.). I have seen no other records of this Old World species from Nevada.

CENTAUREA SOLSTITIALIS L. The yellow star-thistle is not reported from Nevada by Blake (in Tidestrom, p. 620) but I recorded "Washoe County" without specific locality in 1959 (Leaf. West. Bot. 9:25). In 1952 Gullion got it in Clark County (reported elsewhere in this issue), and in 1961 I found it along Highway 395 at the northern base of Peavine Mt. No. 37000.

TRAGOPOGON DUBIUS Scop. This yellow-flowered salsify, which was not known to Blake from Utah or Nevada, grew along Highway 395, 2 miles north of Steamboat Hot Springs, No. 37976. It is not entirely clear from Blake's treatment (in Tidestrom, p. 624) whether he saw Nevada specimens of the two species he lists, *T. pratensis* L. and *T. porrifolius* L. The first I found in waste ground 3 miles south of Reno (No. 37924) and the second near the northern limits of Reno (No. 38080).

XANTHIUM SPINOSUM L. Although I am certain that the spiny clotbur can be found in many a Nevada farmyard, Blake (in Tidestrom, p. 581) lists Verdi as the only locality record. I found the obnoxious thing in waste ground 3 miles south of Reno (No. 37927).

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REDWOOD FIBER BALLS

BY ELIZABETH MC CLINTOCK

One day in August, 1960, while walking on the beach at Noyo Harbor near Fort Bragg we found some curious brown balls which had been washed ashore by the waves along with some pieces of redwood bark. The balls were about an inch to an inch and a half in diameter, round or oval in shape, and solid but felt-like to the touch. They appeared to be composed of the fibers from the much broken and fragmented pieces of redwood bark and subsequent examination proved this to be the case.

Local inquiry regarding these balls led to very little information about them. They appear from time to time, apparently without any regularity and in large enough numbers to cover the beach. The source of the redwood bark from which these fiber balls were formed is certainly the Union Lumber Company's processing plant located on the ocean shore at Fort Bragg. Here the bark of redwood logs after removal by a hydraulic barker is put into a mill pond. Some of the bark is processed for commercial use but that not used spills into the ocean. The action of the waves and currents breaks up the bark and eventually separates it into the fibers of which it is composed. These fibers are pliable and easily tangled and matted when wet. Apparently masses of the fibers get into an eddy or similar local current and there the fibers build up in volume and density and become intertwined and intermeshed into the compact little balls which are washed ashore.

One wonders whether these balls could have any use. Although they apparently have none, redwood fiber has commercial use. In the early years of lumbering redwood bark was discarded but more recently processes have been worked out for separating the bark into its constituent fibers by chemical and

mechanical means. Under the heading "Bark Utilization" Fritz (1957) cites a number of references to products manufactured from the fibers. These include fabrics, felts, and insulating materials. The Union Lumber Company at Fort Bragg manufactures a number of products and through research is trying to find other commercially marketable products for redwood fiber.

The redwood fiber balls may be compared to other plant or vegetable balls which occur occasionally on the shores of lakes or seas in various parts of the world. Probably the best known examples are those found on the shores of the Mediterranean Sea formed from the aquatic flowering plant, *Posidonia oceanica*. The fibrous sheathing leaf-bases of this monocotyledonous plant belonging to the *Potamogetonaceae* become detached and due to the action of the water the fibers are separated from each other and become intertwined and rolled into balls which are washed ashore. These have attracted the attention of those living on the shores of the Mediterranean for centuries. According to Vautier (1954) they were mentioned in the writings of Aristotle and Theophrastus. Vautier mentions several uses for them at various times: by farmers as litter for cattle, by the Greeks to caulk their vessels, and by the Venetians as packing material around their glassware.

Another kind of vegetable ball was reported by Essig (1948) that was formed from the aquatic herb, *Ruppia maritima*, commonly called "ditch grass," a member of the *Ruppiaceae*, a family closely related to the *Potamogetonaceae*. This much-branched herb with filamentous thread-like leaves and stems is found in alkaline or brackish water in California but has a cosmopolitan distribution in other parts of the Northern Hemisphere. According to Essig balls of *Ruppia* were found in considerable number in the summer and fall of 1947 and spring of 1948 in Little Borax Lake, Lake County, California. The balls, found in a relatively restricted area on the eastern shore of the lake, were formed by the action of the waves which rolled the broken filamentous portion of the plants into the tightly woven balls. The conditions which brought about the formation of the balls must have occurred at different times because there were balls in various stages of disintegration along the shore. The conditions for the formation of *Ruppia* balls have not occurred in any of the other localities of this widely distributed plant, at least not so far as known.

Other kinds of water-formed balls have been reported in literature from time to time. From these references it appears that vegetable balls, while locally abundant at times, occur in only very few places and infrequently, so that they are always looked upon as a curiosity.

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THE PIUTE CYPRESS

BY ERNEST C. TWISSELMANN

Cholame, California

Until recently, the Piute cypress (*Cupressus nevadensis* Abrams) has been known from only two colonies in the Piute Mountains of Kern County, California. These colonies have been thoroughly discussed by Carl Wolf (1948). Now, two additional stations can be reported for this Kern County endemic. The first of these is on the east slope of the Greenhorn Range, the southern extension of the Great Western Divide of the Sierra Nevada, and is immediately beside the Greenhorn Pass highway, 2.9 miles west of Wofford Heights (my collection No. 6123). When I first saw the colony on May 4, 1961, it consisted of only three trees. These grew in the bed of a small ephemeral creek that is dry by late spring (or, in dry years, having water for only a brief period in early spring). This creek bed is a jumble of granite boulders and blocks. The nearby rocky slopes are covered with sparse chaparral and scattered digger pines in places that offer protection to a degree from fire. From the general appearance of the area, I surmised that the cypresses might well be the survivors of a much more extensive colony that had been swept by fire, perhaps repeatedly. In October, 1961, my theory was given a sounder basis when a wild fire swept that region. Two of the three trees were burned; one was spared by a margin of less than ten feet. So the Sierra Nevada occurrence of the Piute cypress now consists of only this tree. Located imme-

diately beside a new heavily traveled highway, it is probable that this lone cypress will not for long survive the activities attendant on the greatly increased recreational use of the region. However, the record of the three trees will serve to place the species in the Sierra Nevada¹, and finally to give geographic validity to Abrams' specific epithet.

Mrs. Charlotte Nash Smith, a Granite Station rancher who has an intimate knowledge of the botany of the Greenhorn Range, has written me that she has no knowledge of any other Piute cypresses in the Greenhorn Range or other portions of the southern Sierra Nevada. She further states that neither the late Howard Bilton, long-time predator control officer for the California Fish and Game Commission, nor the late Robert Beard, a United States Forest Service Ranger, both of whom had a keen knowledge of the trees of the southern Sierra, knew of any other colony. The Greenhorn colony had been known to Mrs. Smith; she first observed it in the late 1930's, but she didn't realize its significance.

For details on the second recently discovered colony I am indebted to Mr. James R. S. Toland, District Ranger, Greenhorn Division, U.S. Forest Service. He reports (pers. comm.) that there is a grove of approximately forty acres on rugged Hobo Ridge on the north slope of Breckenridge Mountain (a fault block mountain separated from the Greenhorn Range by the Kern River gorge). This is a colony of well-developed trees, the largest about thirty feet tall with a trunk diameter at breast height of approximately ten inches. The colony grows on a steep north slope, at the upper levels of the digger pine belt at an elevation of about 3500 feet.

Of the two previously reported stations, the best known by far is the grove a few miles south of Bodfish in the region of Bodfish Peak at the north end of Piute Mountain. This is the type locality and is described in detail by Wolf. Here there are thousands of trees of all ages. The best-developed trees are at the lower elevations and it might be well to repeat what Wolf implied. For the most part, the best specimens grow on private land, below the National Forest boundaries, where considerable cutting and clearing of both cypress and chaparral has occur-

¹ Neither botanists nor geologists are in complete agreement on the southern limits of the Sierra Nevada. However, most geologists end the western and central portion at South Fork Valley and lower Kern River Canyon. Thus, Breckenridge Mountain and the Piute Mts., while associated with the Sierran system, are not usually considered part of it.

red. (According to Wolf, the tree was once much cut for fence posts.) As one goes up the mountain, the chaparral becomes dense and the trees are quite small and either spindly or shrubby. It is, then, a tree that is at its best with a minimum of competition and a maximum of sunlight, especially on the lower branches which have a tendency to die back in shaded situations.

The fourth known grove is the Back Canyon grove, about 20 miles southeast of the Bodfish grove, at the south end of Piute Mountain. It consists at most of a few hundred mostly senescent trees, in the most arid region of the four. Probably the only reason this grove has not been exterminated or severely reduced is that the sparse brush and generally scant vegetation of the region render it incapable of carrying a really devastating fire. Further, its isolated location, far from the nearest public road and in a region of relatively little human activity, has been a factor favorable to its survival.

To summarize briefly the four known localities for the tree: The Greenhorn occurrence, consisting of but a single surviving tree, probably the remnant of a much larger grove, grows in a quite arid region of sparse chaparral and occasional digger pines, in poor granitic largely rocky soil along an ephemeral creek on a hot dry slope. It is 9 miles northwest of the Bodfish grove. The Hobo Ridge grove, approximately 4.5 miles west of the Bodfish grove, though small is a healthy colony growing in good soil of granitic origin, on a steep north slope, in a situation that approximates that of the Bodfish grove. The Back Canyon grove grows in decomposed granite and black clay in the most arid region of the four. The Bodfish grove grows in a variety of soils, from fractured rock to fairly deep top soil and is probably most abundant in red clay. (Specialized soil needs, it would appear, are not a limiting factor in the tree's distribution.) The steep slopes of Bodfish Peak and Bald Eagle Peak, the ridge summits at the north end of Piute Mountain, shelter the grove from the hot winds that funnel through Kern Canyon and South Fork Valley. The climate is the least arid of the four localities and it is here that the tree is at its best.

When contemplating a rare or vanishing plant, one always ponders the often baffling question "why?" There is a fairly plausible explanation to account for the limited range of the Piute cypress. If we accept the theory, brilliantly summarized by Daniel I. Axelrod (1958), that until the late Pliocene the

Mojave Desert was an arid woodland, and further if we accept Wolf's concept that *Cupressus nevadensis* is most closely related to *C. arizonica* Greene, a tree common from southern Arizona to western Texas, it is easy to postulate that *C. nevadensis* is a relic precariously surviving on the western edge of that once vast woodland. Support is given this theory by the presence of Arizona hackberry (*Celtis reticulata* Torr.) at Caliente Canyon on the south border of the Breckenridge-Piute complex, at Democrat Hot Springs in Kern Canyon, and at Lone Pine at the extreme northwest corner of the Mojave Desert. The hackberry is common in Arizona and the Southwest beyond the Mojave Desert. Harlan Lewis (1960) has used the same reasoning to account for the distribution of *Trichostema austromontanum* Lewis. Its probable parents were *T. oblongum* Benth. and *T. micranthum* Gray. The first is now restricted to the Sierra Nevada, the second to the San Bernardino Mountains and to a single station in northern Baja California, and to another in northwestern Arizona. Obviously, they were both once sympatric. The hybrid, *T. austromontanum*, is not uncommon in favorable years in the meadows of the yellow pine forests of the Piute Mountains and at Squirrel Meadow on Breckenridge Mountain.

The fossil record, although scant, is perhaps even more impressive. Fossil *Cupressus mohavensis* was discovered in a Miocene bed in Sand Canyon, only eleven miles south of the Back Canyon grove of *C. nevadensis*. Axelrod (1939) relates it very closely to *C. arizonica*. The remainder of the fossil flora from Sand Canyon suggests a climate and a flora similar to that now existing at Bodfish Peak and Hobo Ridge, although somewhat warmer and perhaps slightly more arid. On the other hand, the present pinyon-California juniper association at Sand Canyon, while quite different from chaparral and digger pine associations, would require only minor and perhaps merely subtle climatic changes to be replaced by them. (Indeed, the floor of Sand Canyon has a few obviously senescent digger pines.) It appears quite likely that the long-term drying of the local climate is well on its way to extinguish the Back Canyon *Cupressus nevadensis* population, in probably the same way in which the Sand Canyon fossil *C. mohavensis* was exterminated.

Another fossil record shows the more recent desert occurrence of a cypress closely related to *C. arizonica* and *C. nevadensis*.

This comes from the Ricardo flora of Last Chance Canyon in the central part of the El Paso Range, a region now occupied by typical Mojavean creosote bush and desert canyon associations. The record, reported by Webber (1933), was of wood, and he was unable to arrive at a specific determination. It does, however, establish the fact that at least as recently as Pliocene time a *Cupressus* not unlike *C. nevadensis* grew on the Mojave Desert. Further it and the other Ricardo fossil species show that at least as recently as Pliocene time, the picturesque very xerophytic Last Chance Canyon region maintained a woodland similar to that now found in the region occupied by the Piute cypress. (The Bodfish grove is about thirty miles west of Last Chance Canyon, the Back Canyon grove about twenty miles southwest.)

Thus, it is certainly a reasonable theory that the Piute cypress is a remnant of a once widespread complex occurring across the Mojave Desert and that it has been progressively restricted by increasing aridity and associated factors. Also, it seems tenable that geographic isolation could account for the specific distinctions between it and *C. arizonica*, as well as the closely related (acc. Wolf) and highly localized Tecate cypress (*C. Forbesii* Jeps.) of the mountains east of San Diego and the San Pedro Martir cypress (*C. montana* Wiggins) of Baja California. That the process of restriction and possible eventual extinction is continuing is amply demonstrated by the condition of the trees at Back Canyon, and, that it may continue to its ultimate end is demonstrated by the fire of 1961 that reduced the Sierra Nevada population to one tree.

The U.S. Forest Service is now aware of the unique characters of this tree, some of which were described by Wolf (1948, p. 119) as "so symmetrical and pyramidal that they were unrivaled in beauty by any wild cypress elsewhere in California." It is to be hoped that special fire protection and other management attention will be given at least to the Bodfish grove. It is entirely fitting and desirable that this rare endemic of the arid Kern County mountains, of interest to both the scientist and the layman, be given the care and protection that has been given the Monterey cypress, the Torrey pine, the sequoias, the California fan palm, and the other beautiful and rare trees that so greatly enrich California's natural heritage.

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A PIUTE CYPRESS POSTSCRIPT

BY JOHN THOMAS HOWELL

The Black Mountain fire which killed two-thirds of the Piute cypresses on the east front of the Greenhorn Mountains occurred in 1961 at the opening of deer hunting. One year later on Sept. 23, 1962, on the second day of "deer season," I visited the gully where the lone Sierran Piute survivor of the fire grows and I spent a little time exploring the rocky stream bed above it where its two dead companions were still standing. Of the two trees that were killed, the upper one had been killed by burning, the charred trunk and major branches having lost all branchlets and foliage. The lower tree was apparently killed from exposure to the excessive heat of the fire but was not burned, since even a year after the fire the branches were still carrying dense masses of brown leafy twigs. Obviously the lone survivor was far enough away to withstand the heat from the fire that had raged up the canyon, perhaps saved by a strong up-draft of cooling air from the unburned slopes below.

I looked for seedlings under each of the trees, because I thought the Piute cypress might respond to fire in a regenerative way as I had known the Sargent cypress to react to the 1945 fire in Marin County.* What I observed confirmed my suspicion that the Piute cypress might also be a fire-type tree. No seedlings were seen beneath the two lowest trees, but under the uppermost tree that had been burned I counted more than 40 seedlings, the tallest of which was already about four inches in height and appeared fine and very vigorous. The soil in which they were growing was pure ash and mineral matter, all humus

* Cf. "Carbonated Landscape," *Sierra Club Bulletin*, Vol. 31, No. 7, p. 20 (1946).

having been consumed in the holocaust. The soil beneath the two lower trees had not been burned but was covered by summer-dry annual grasses and other herbs. Either the effect of the heat on the seeds or the reaction of the seeds to the ashy soil (or both) would appear to have had an immediate germinative influence on the reproduction of the Piute cypress.

If man and his bovine beasts can be restrained (the gully would appear to be a place where cattle gather and ruminate), I predict that shortly a congested grove of lusty Piutes will grow where one lone parent died.

SEX CHANGE IN ONE-SEED JUNIPER TREES

BY THOMAS N. JOHNSEN, JR.

Flagstaff, Arizona

One-seed juniper [*Juniperus monosperma* (Engelm.) Sarg.] is described as having the sexes on different trees (Sudworth, 1915). However, several specimens of this southwestern tree have been reported as having cones of both sexes on the same branch (Whiting, 1942) and the author has seen others in the field. Hall (1955) believed that even the most strongly dioecious juniper species may occasionally have both sexes on the same tree. Even so, no one has reported an apparently complete change in the sex of these trees.

Records have been kept of several thousand individually tagged one-seed junipers in studies of chemical control of juniper begun in 1956 in Arizona. These trees are checked twice a year. Among the data recorded is tree sex, when this can be determined by the presence of cones on the tree.

Three trees located about 25 miles north of Flagstaff, Coconino County, in the Deadman Flat area have apparently changed sexes. One tree, 5 feet tall, had been treated with a polychlorinated benzoic acid during 1958. It was a male tree during 1958 and 1959; since June, 1960, only female cones have been present. The other two trees, both 3.5 feet tall, were not treated with chemicals. Observations on them began in June, 1959, when they were male trees; since June, 1960, they have produced only female cones.

It is not known what may have brought about the sex change in these one-seed juniper trees. Since individual trees of this

species have not previously been observed over a period of time, this sex change may be characteristic of the species. However, since only three trees among the several thousand under observation have done this, it is probable that these are unusual.

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Flagstaff, Arizona

BOUTELLOUA UNIFLORA IN UTAH. Systematic studies of the grass *Bouteloua curtipendula* (Michx.) Torr. and its close relatives have revealed an exceedingly interesting distributional record for southern Utah. A specimen of the collection *W. A. Silveus* 3339 from Zion National Park, Washington County, Utah, has been determined to be *B. uniflora* Vasey. The specimen, in the herbarium of the University of Texas, originally was identified as *B. curtipendula*. The known range of *B. uniflora* thus has been extended from central and western Texas and northern Mexico to southwestern Utah.

Bouteloua uniflora is one of several diploids ($2n=20$) believed to be ancestral to the polymorphic *B. curtipendula*. The known presence of *B. uniflora* in southern Utah helps to account for the preponderance of cespitose *B. curtipendula* plants with a mean of 2-2.9 spikelets for each inflorescence branch in southern Utah, northern Arizona, and southern California. *Bouteloua uniflora*, with rare exception, has one spikelet for each inflorescence branch and, outside of the range of this species and the other basic diploids with one spikelet, cespitose *B. curtipendula* plants characteristically have a mean of more than three spikelets to a branch.

Further localities for *B. uniflora* are to be looked for in southern Utah, northern Arizona, and central New Mexico. This species is adapted to rather fertile soils in rocky, often partially shaded sites.—FRANK W. GOULD AND ZARIR J. KAPADIA, Department of Range and Forestry, A. and M. College of Texas.

A NEW CALIFORNIA RECORD FOR *TILLAEA MUSCOSA* (CRASSULACEAE). While collecting *Arctostaphylos myrtifolia* Parry in the hills north of San Andreas, Calaveras County, California, I noticed several rosettes of *Riccia* growing on a cleared area in damp soil. I brought soil containing the liverwort into the greenhouse for culturing. As is the case with most of our liverwort collections, I placed the soil on damp sphagnum moss to keep the culture from drying out. After several months other plants began to sprout from seeds already in the soil. Among these was the European species *Tillaea muscosa* L., growing in sufficient quantity to indicate great abundance in the San Andreas area.

Because of the endemic nature of *Arctostaphylos myrtifolia* (found only around Ione in Amador County, in scattered locations to the south of Ione, and in a disjunct area near San Andreas) and the fact that *Tillaea muscosa* has been reported from Ione, one wonders if this species is not actually native to California too. Regardless of this point, it is of interest that this species grows in association with *Arctostaphylos myrtifolia*.—ROMAN GANKIN, University of California, Davis, California.

CORONOPUS AND SHERARDIA IN ARIZONA

Coronopus didymus (L.) Smith is not listed in Arizona Flora by Kearney and Peebles (1951) or in the supplement by Howell and McClintock (1960). This crucifer was collected by the author from established colonies in the lawn at the University of Arizona, Tucson, Pima County, on May 4, 1961. *Coronopus didymus*, an introduced species, has been reported from "British Columbia to California, and across the continent . . ." (Abrams, Ill. Fl. Pac. States 2:263,—1944).

Sherardia arvensis L. was collected by the author from partially shaded lawn on the University of Arizona campus on May 10, 1961. The unreported collection of this species from a shaded lawn also in Tucson by R. T. Barr on May 24, 1957, is the first record of this genus for Arizona. Subsequently, a third specimen of *Sherardia arvensis* was sent to the University of Arizona Herbarium for identification by the Maricopa County Agent's office. The nearest locality previously reported for *Sherardia* is southern California (Abrams & Ferris, Ill. Fl. Pac. States 4:24,—1960). Barr's collection and that of the author was filed in the University of Arizona Herbarium.—MARSH PITMAN, Hayward High School, Hayward, California.

LEAFLETS
of
WESTERN BOTANY

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SALPICHROA ORIGANIFOLIA INSTEAD OF S. RHOMBOIDEA (SOLANACEAE)

BY LLOYD H. SHINNERS

Southern Methodist University, Dallas, Texas

Both the new Munz and Keck A California Flora and the third volume of the Abrams Illustrated Flora of the Pacific States (*Solanaceae* by Wiggins) use the binomial *Salpichroa rhomboidea* (Gillies & Hooker) Miers for the lily-of-the-valley vine, the latter work noting the type locality as Buenos Aires, Argentina. In Cabrera's Manual de la Flora de los Alrededores de Buenos Aires only one species is described, *S. origanifolia* (Lamarck) Thellung, noted as adventive in Europe but not so reported for North America. There is no mention of the name *S. rhomboidea*. The two are in fact synonymous, but the former combination was first published by Baillon rather than Thellung. The plant appears in Small's Flora of the Southeastern United States and in his Manual of the Southeastern Flora as *Perizoma rhomboidea* (Hooker) Small, without mention of the genus *Salpichroa* or the epithet *origanifolia*. Cory in 1948 reported it from Texas, using Small's nomenclature. The revised edition of Bailey's Manual of Cultivated Plants lists it as *Salpichroa rhomboidea*, without mention of *Perizoma*. The Royal Horticultural Society's recent Dictionary of Gardening does the same. The only recent generic account (no more than a key appended to the description of several new species) mentions neither *Perizoma* nor the epithet *rhomboidea* (Benoist, 1938).

Because no recent publication gives the name entirely correctly, because the incomplete synonymy in standard references may cause misunderstanding as to the identity of the one species involved, and because of an orthographic variant, it is worth reviewing the relevant synonymy of both genus and species.

SALPICHROA Miers, London Journ. Bot. 4:321 (1845). Name altered to *Salpichroma* by Miers himself, l.c. 7:333 (1848). (These references not seen; taken from Dunal, 1852.) About this Alphonse de Candolle (in footnote in Dunal's treatment, p. 471) noted sourly, "I have not deemed it necessary to correct this name, badly formed from *salpix*, trumpet, and *chroma*, color, but I have made it neuter and not feminine." Bailey more

charitably suggests a derivation from "Greek *tube* or *trumpet*, and *skin* or *complexion*," and leaves it feminine, as does the RHS Dictionary. Under the present rules, of course, Miers was entitled to form the name as he pleased, even altogether arbitrarily. Despite his own later alteration, the original spelling and gender must be kept. *Salpichroma* is only a variant spelling, not a new name, and species published under it are valid and do not require transfer. Several appear in Index Kewensis in italics, as if not acceptable, and as late as 1916 a species was still named under *Salpichroma*.

S. *ORIGANIFOLIA* (Lamarck) Baillon, Hist. Pl. 9:288 (1888). (Reference not seen; taken from Gray Herbarium Card Index, which supplies first authority and basonym in brackets. Present rules allow considerable latitude with regard to deficiency of bibliographic citations prior to 1953.) Combination also published by Thellung, La Flore Adventice de Montpellier (Mém. Soc. Nationale des Sciences Naturelles et Mathématiques de Cherbourg t. 38) p. 452 (1912). Based on *Physalis origanifolia* Lamarck, Illustr. 2:28 (1797) ["1793"]. Lamarck's description is so brief that one can scarcely identify his plant from it, but a much more full and unmistakable account, doubtless based on plants of the same origin, appears in the next reference.—*Atropa origanifolia* (Lamarck) Desfontaines, Cat. Pl. Hort. Reg. Paris. (ed. 3) p. 396 (1829).—*A. rhomboidea* Gillies & Hooker ex Hooker, Bot. Misc. 1:135–136, pl. xxxvii (1829) ["1830"]. —*Salpichroa rhomboidea* (Gillies & Hooker) Miers, London Journ. Bot. 4:326 (1845). —*Perizoma rhomboidea* ("Hooker") Small, Fl. S.E. U.S. p. 991 and 1337 (1903).

Although the name *Perizoma* (as genus) is credited to Miers, he appears to have used it only for a section under *Salpichroa*. In the first edition of Lindley's The Vegetable Kingdom (1846, p. 622) it appears as a bare name in a list of genera of the *Solanaceae*. This may have been a clerical error, for subsequently (I have seen further only ed. 3, 1853, p. 622b) it appears only in italics as a synonym of *Salpichroa* (text for the latter edition supplied by Miers). Under the practices of the time, the listing in edition one may be accepted as valid publication in generic rank of *Perizoma* Miers ex Lindley, as is done by Index Kewensis and by Dalla Torre and Harms. Otherwise the only formal treatment of *Perizoma* as genus is that by Small in 1903 and subsequently.

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ERRATA

- Page 53, line 36: *read nigh for night.*
- Page 63, line 11: *read 538 for 835.*
- Page 64, line 25: *read Sherfey for Sharfey.*
- Page 70, line 34: *read gardens for gardents.*
- Page 77, line 3: *insert) after 1957.*
- Page 89, line 35. The holotype of *Astragalus fucatus* Barneby is *Peebles 13392* (CAS), not *11392*.
- Page 112, line 16: *read 25341 for 25431.*
- Page 129, line 16: *read do for does.*
- Page 133, line 28: *read campylopodum for camplopodum.*
- Page 150, line 18: *insert California after counties.*
- Page 170, line 41: *read attached near or a little below the middle of the lemma.*

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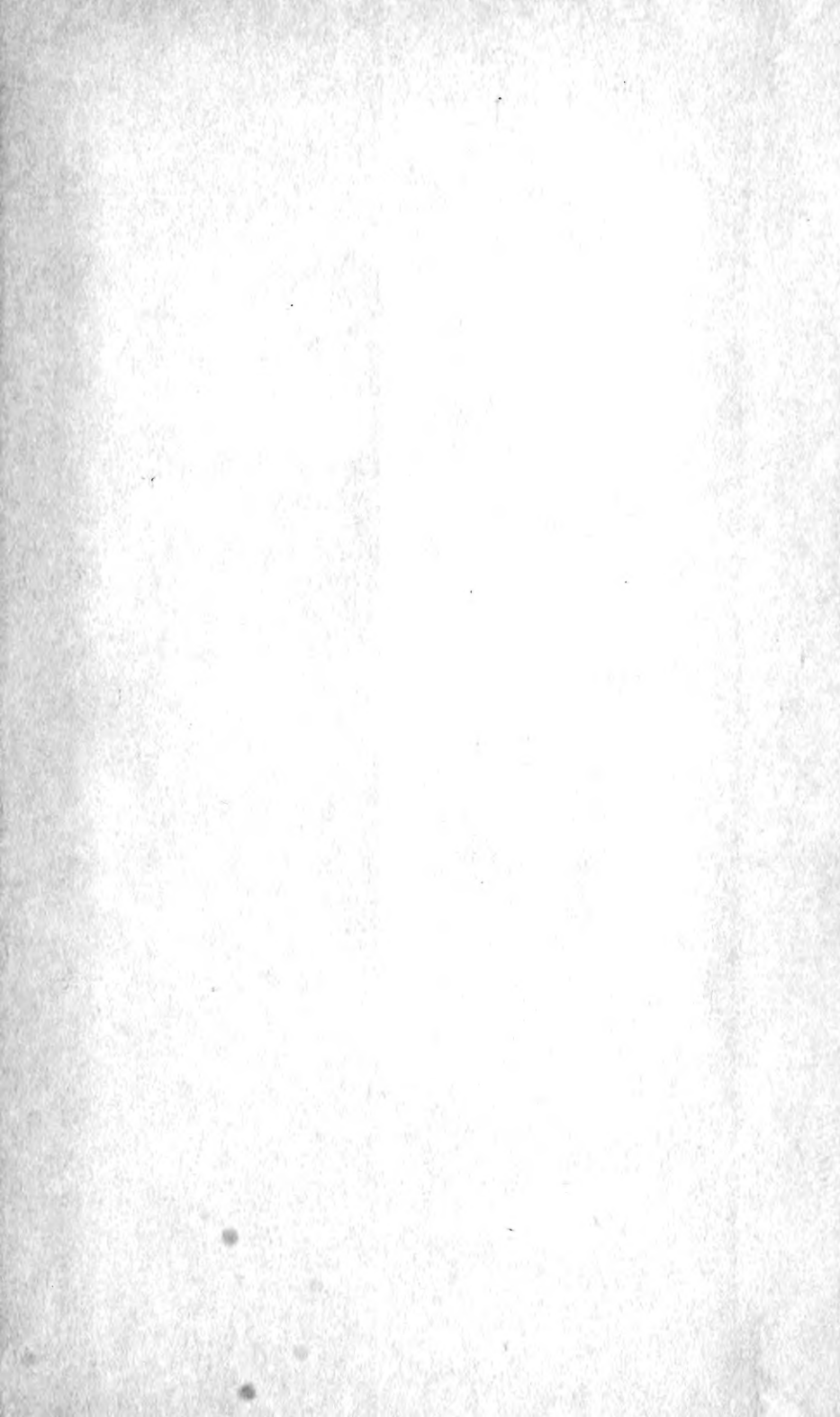
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